CTOB R

Farm Chemicals

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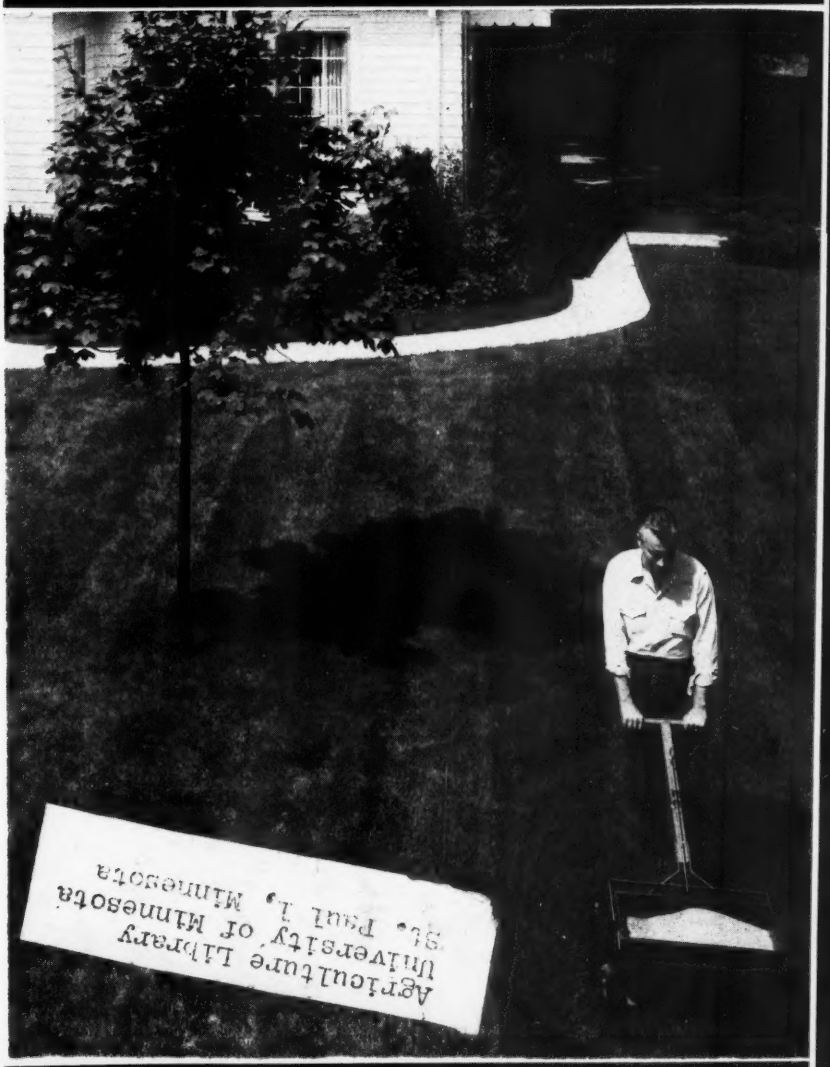

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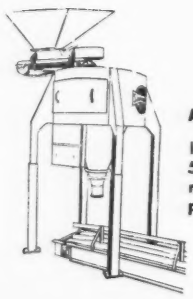
for Storing and Shipping Fertilizer!

M/W MULTIWALL PAPER BAGS

by CHASE BAG



ASK US ABOUT THE SOUTHLAND PACKER

It's clean, simple, fast, accurate . . . fills 50-lb., 80-lb., and 100-lb. bags—takes minimum floor space. Chase Bag Company is exclusive distributor.

Multiwall Bags, like everything else, should be *right* for the job—right for *you*. Anything less wastes your time and dollars, means loss and inconvenience to customers.

That's why Chase supplies Multiwalls in such wide variety, in so many types and constructions . . . why the many Chase options—in papers, tapes, sewing—permit precise, money-saving selection.

Chase recommendations are backed by 110 years of bag-making progress . . . of service and satisfaction. It's wise to specify "Chase" for *dependable* Multiwalls—for uniformity, durability, attractive bag printing . . . reliable shipment.

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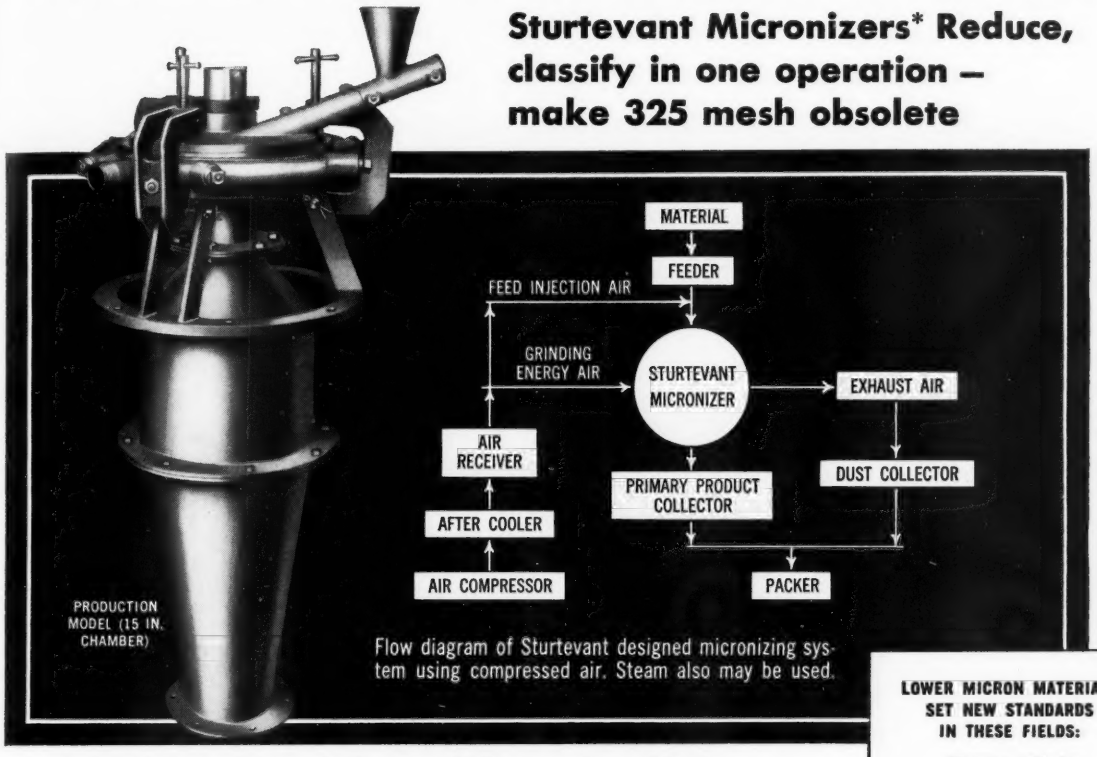
32 Coast-to-Coast Bag Plants and Sales Offices—a Nationwide Staff of Bag Specialists

Need ½ to 44 Micron Particles?

Sturtevant Micronizers* Reduce, classify in one operation — make 325 mesh obsolete



Flow diagram of Sturtevant designed micronizing system using compressed air. Steam also may be used.

Particles Grind Each Other, Classifying is Simultaneous; No Attritional Heat

One operation. Sturtevant Micronizers grind and classify in a single fluid-jet chamber — provide fines in range from ½ to 44 microns to meet today's increased product fineness requirements. Because of impact action and cool atmosphere, even heat-sensitive materials can be handled.

No moving parts. Particles in high speed rotation, propelled by compressed air or steam entering shallow grinding chamber at angles to periphery grind each other by violent impact. Design provides for instant accessibility, easy cleaning.

Simultaneous classification. Centrifugal force keeps over-size materials in the grinding zone, cyclone action in central section of chamber classifies and collects fines for bagging. Rate of feed and pressure control particle size of fines.

Can combine other processes. Sturtevant Micronizers can be adapted for coating one material with another and for effecting chemical reactions and changes in physical characteristics, while in process of reducing solids to micron size.

Eight models available. Grinding chambers are in eight sizes, ranging from 2 in. diameter laboratory model (½ to 1 lb. per hr. capacity) to large 36 in. diameter production model (500 to 4000 lbs. per hr. capacity). Send today for fully descriptive literature.

LOWER MICRON MATERIALS SET NEW STANDARDS IN THESE FIELDS:

Pharmaceuticals
Pigments (natural and synthetic)
Copper compounds
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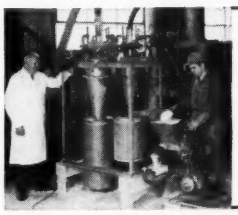
Aluminum compounds
Resins
Flour
Sugar
Calcium compounds
Heat sensitive materials
Magnesium compounds
Zinc compounds
Waxes and fatty acids
Fungicides and insecticides

Fluid-Jet Systems For Special Needs

A 30 in. Sturtevant Micronizer is reducing titanium dioxide to particle size under 1 micron at a feed rate of 2250 lbs. per hr. For another firm, a 24 in. model grinds 50% DDT to 3.5 average microns at a solid feed rate of 1200 to 1400 lbs. per hr. A pharmaceutical house is using an 8 in. model to produce procaine-penicillin fines in the 5 to 20 micron range. Iron oxide pigment is being reduced by a 30 in. Micronizer to 2 to 3 average microns at rates of 1000 lbs. per hr. Sturtevant Engineers will help you plan a Fluid-Jet system for your ultra-fine grinding and classifying requirements. *Write today.*



CAN TEST OR CONTRACT MICRONIZING HELP YOU?

Laboratory test-micronizing of your own material, or production micronizing on contract basis, are part of Sturtevant service. See for yourself the improvement ultra-fine grinding can contribute to your product. Or, if you have limited requirements for ultra-fine grinding, Sturtevant's contract micronizing service may be the economical answer. Write for full details.

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IN THIS ISSUE

▶ Two questions which everyone at NAC's 24th annual meeting seemed to want answered were "How much can we sell?" and "How can we sell it?" While speakers may not have given specific answers, they did present a lot to think about and analyze . . . **page 33.**

▶ How do farm people accept new ideas and practices? The five stages in the mental process are discussed by Drs. Bohlen and Beal of Iowa State . . . **page 35.**

▶ New avenues of usefulness and practibility for gibberellic acid are being opened by scientists. Farm Chemicals presents a progress report on this versatile plant growth regulator . . . **page 38.**

▶ A survey on fertilizer sales to the non-farm market has been conducted by the National Plant Food Institute. For the results in brief . . . **page 41.**

▶ This month fertilizer safety men will gather in Chicago during the National Safety Congress. The lineup of speakers and their topics is on **page 43.**

▶ Facts and figures on the ag pilot have been compiled by the National Aviation Trades Association's Agricultural Activities Div . . . **page 44.**

COVER PICTURE

A home dweller applies plant food to his lawn. NPFI's survey (page 41) shows that private homes account for about half the total use of fertilizer for non-farm purposes.

Farm Chemicals

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PIONEER JOURNAL OF THE INDUSTRY

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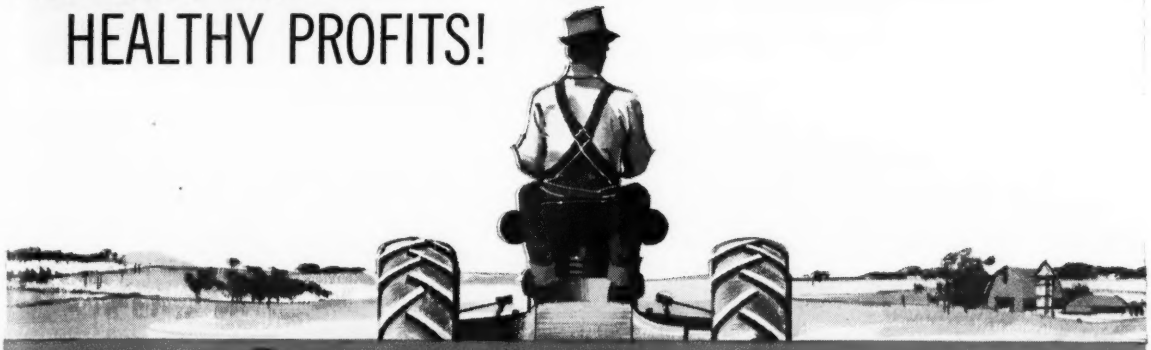
HEALTHY PROFITS!



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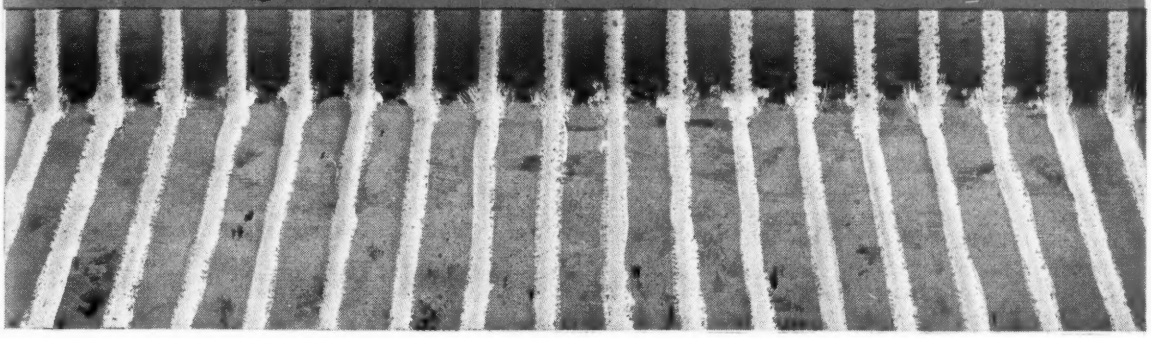
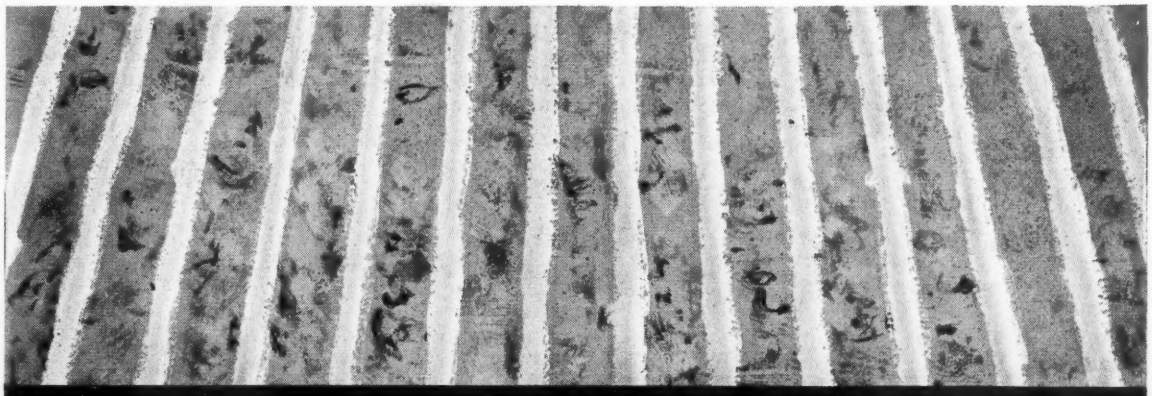


DUVAL SULPHUR and POTASH COMPANY

MODERN PLANT AND REFINERY AT CARLSBAD, NEW MEXICO



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HERCULES CALIF. PLANT TO PRODUCE UREA

Hercules Powder Co. has announced it will start construction immediately of facilities to produce 10,000 tons per year of urea at its Hercules, Calif., plant. Raw materials, anhydrous ammonia and carbon dioxide, are both currently produced at the plant.

Completion of the new facilities is expected by late 1958.

AAC BUYS ASSETS OF BUHNER FERTILIZER CO.

The American Agricultural Chemical Co. has contracted to purchase the physical assets of the Buhner Fertilizer Co., Inc., of Seymour, Ind. and Danville, Ill.

AAC has 30 plants and sales offices in this country, Canada and Cuba and has been engaged in the manufacture of fertilizers and heavy chemicals for over 85 years.

DOW ANNOUNCES INCREASE IN WEED KILLER PRICES

Price increases will be placed in effect October 1 on all 2,4-D weed killer formulations, W. W. Allen, agricultural chemicals sales manager for Dow Chemical Co., reports. The change will amount to about 8 per cent on the various 2,4-D products, he said.

The move is being made to compensate for increased steel costs in containers, higher freight rates and increases in general operating costs. The company pointed out that even with the present increase, prices will be far below those of 1951.

INCORPORATIONS

Imperial Oil and Fertilizer Co., Inc., Macon, Miss., has been granted charter of incorporation listing capital stock of $75,000.

Northeast Mississippi Fertilizer Co., Inc., Amory, Miss., has been granted a charter to manufacture chemicals and fertilizers, listing capital stock of $60,000.

IMC PLANS $20 MILLION POTASH MINE IN CANADA

International Minerals & Chemical Corp. plans to spend more than 20 million dollars on construction near Esterhazy, Sask., Canada, of "the most modern and efficient potash mine in the world."

Louis Ware, president of IMC and its Canadian subsidiary, International Minerals & Chemical Corp., (Canada) Ltd., said that the new mine, for which a 3,000 foot shaft is now being sunk, would play an important part in "making the North American continent self-sufficient in its need for potash for centuries to come.

"With continued development of Saskatchewan's ore reserves by this company and others, Canada and the United States ultimately will account for a major part of the world potash supply," he said.

Tentative plans call for the employment of from 100 to 150 persons at the mine, the IMC president said. A small, experienced staff of technicians and experts from the company's Carlsbad, New Mexico, operation will train local workers at the outset, with local workmen taking over as their training is completed.

Ware spoke optimistically about future demand for potash, despite its present good world supply.

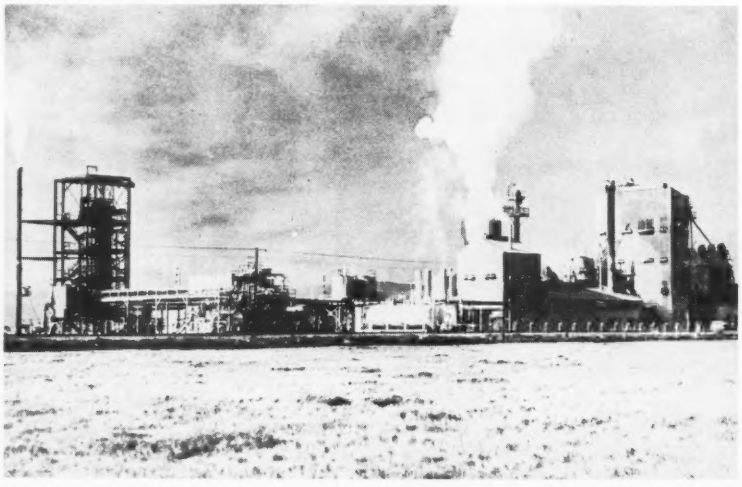
"There has been a steady growth in the consumption of potash in recent years, not only in the United States, but elsewhere in the world," he said, "and this leads us to believe that there will be an era of increasing and lasting demand."

WESTVACO COMPLETES PHOSPHATE EXPANSION

Westvaco Mineral Products Div. of Food Machinery and Chemical Corp. reports it has just completed a major expansion of its phosphoric acid and phosphate facilities at Newark, Calif., making it the largest producer of these materials west of the Rocky Mountains.

The new facilities double the phosphate capacity of the Newark plant and may be operated separately, giving Westvaco great flexibility in the manufacture of its complete line of inorganic phosphates. A major expansion in phosphoric acid capacity also was recently completed. Additional finished product storage and bulk loading facilities have been added to improve customer service.

Westvaco Newark, Calif. phosphate plant



One machine to handle
ALL bulk and bagged materials

Illinois fertilizer plant buys Michigan's quarry-proved dependability

To everyone who uses material-handling equipment, the problem of dependability is a critical matter. It becomes absolutely vital, though, when you're like Hoover Soil Service of Gilman, Illinois.

Hoover's problem was to find a machine which *by itself* could handle *all* material in their bustling 20-year-old fertilizer plant. It had to be fast and versatile and, above all, as trouble-free as possible. Their study of available units included the usual comparison of specs, talks with salesmen and users, pricing, and so on.

Power Shift, Torque Converter

"Our ultimate choice was a Michigan Tractor Shovel!" says Owner Roy Hoover.

Loading bagged mixed fertilizer onto truck, Michigan often lifts 18 bags (1,440 lbs) at once.

"There were lots of reasons. But the clincher came the day we learned that our neighbors, Lehigh Stone Company of Kankakee had changed to Michigans and were very happy with them. If a Michigan could work satisfactorily under the constant use of their quarry, we reasoned it certainly would do well on our less-punishing job. The size we wanted, Michigan's 15 cubic foot Model 12B, we noted had many of the same design features as the larger quarry-model Michigans (including power-shift, torque converter, planetary axles). So we got it —and it's done even better than we hoped."

Drives safely, quickly in traffic

Today the 44 hp, 11 mph Michigan does *all* handling and *all* lifting not only at Hoover's main plant but also at their auxiliary warehouse four blocks away. Trips back and forth take only two to five minutes despite necessity to travel along the town's busy main street (U.S. 54-45-24).

Easily maneuvers through 5′ door

Unloading boxcars is a typical job. Average 50 ton car requires less than 100 trips for complete unloading, according to Owner Hoover. *"Michigan has no trouble getting in or out of any single-door car,"* he adds, *"regardless of whether it has a 5-foot or 6-foot door.* Our bucket has been extended two inches, too, over the standard bucket."

Feeds mixer, lifts bags, spots cars

Other Michigan jobs include stockpiling bulk phosphate, potash, urea and other raw materials and feeding the one-ton mixer. Michigan also hauls bags of mixed fertilizer. It loads both bagged and bulk material onto trucks. It spots boxcars, one or two at a time, both loaded and empty. Despite its heavy work schedule a simple maintenance program has reduced downtime to practically zero.

See 12B in action in your plant

Dependability and versatility like this are features of *every* Michigan Tractor Shovel. Let your Michigan distributor help you pick the size best suited to your needs: 6 cubic *feet* to 5 cubic *yards.*

Michigan is a registered trade-mark of

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FARM CHEMICALS

— *Business & Management* —

HAZLETON LABORATORIES OPENS WESTERN PLANT

On September 1, Hazleton Laboratories, independent biological research laboratory, opened its Western Division in Palo Alto, Calif. The new laboratory will specialize in determining the amount of pesticide residue left on foods and crops after dusting or spraying, and how long it persists.

Dr. Ralph Fogleman, former head of the Agricultural Chemicals Dept. at Hazleton Laboratories, has been named manager of the western Div., while Dr. Robert Bruce will supervise residue analysis. Theodore Tuft, entomologist, who had been with the research and development staff of American Cyanamid Co., will conduct field trials and supervise crop sampling.

TEXAS RANCH USES RECORD ORDER OF ROCK PHOSPHATE

More than 700 tons of powdered rock phosphate, believed to be the largest single order of plant food ever delivered at one time to any individual, has been used by a Texas rancher on 1,400 acres of land being developed for grazing, hay and seed production.

Unloading and spreading the huge shipment over 1,400 acres of the Arthur Stieren ranch near Nixon, Tex. took five fan-type spreader trucks about a week.

The plant food was shipped by International Minerals & Chemical Corp. from its Bartow, Fla., plant. Spreading was done by E. R. Adams of Beaumont, Tex.

DBL TO CLOSE RICHMOND NICOTINE OPERATION

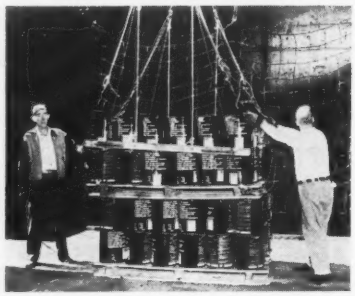
Diamond Black Leaf Co. has announced it plans to close its nicotine extraction plant at Richmond, Va. Suspension of operations at the 39-year old plant is "due chiefly to uncertainties presently governing the nicotine and ground stem tobacco market in the Eastern United States, a condition resulting from the steady decline of the market in recent years," said George V. Dupont, general manager.

The shut-down will not affect the company's Research and Development Group or its Eastern District sales office, both of which are also at Richmond.

J. M. HUBER FORMS NEW INTERNATIONAL DEPT.

A new International Department to handle all its foreign business has been created by the J. M. Huber Corp. The department will be headed by Peter Schoenburg, present director of export of the company, and will be located in Huber's New York headquarters.

CHEM-LIN FOR KOREA



New York longshoremen are shown loading part of ten truckloads of Chem-Lin 20 (Emulsifiable) aboard the SS Pioneer Mist, for shipment to Korea. The shipment was ordered by the Korean Ministry of Health.

In Korea, Chem-Lin will be used in a nationwide campaign of extermination against agricultural pests, disease-bearing rodents, mosquitoes, gnats, roaches, silverfish, spiders, clothes moths, bedbugs and flies. It is manufactured by Chemical Insecticide Corp. of Metuchen, N. J.

ADDRESS CHANGES

In September, *Chemical Insecticide Corp.* moved its executive and sales offices to 30 Whitman Avenue, Metuchen, N. J. New phone number is Metuchen, N. J. LIberty 9-2300.

Offices of the *Connecticut Agricultural Experiment Station* formerly in the Whitney Building, New Haven, have been moved to Osborne Library on the station's Huntington St. property.

ORGANIZE NUCLEAR CHEMICAL COMPANY

The Nuclear Chemical Co. has been organized with offices and laboratories located at 1952 West Irving Park Road, Chicago 13, Ill. The firm will manufacture and supply organic compounds tagged with radioactive carbon, hydrogen, phosphorous and sulfur. Compounds in such categories as organic acids, alcohols, carbohydrates, fatty acids, amino acids, steroids, vitamins, antibiotics, enzymes and others tagged with these radioactive isotopes will be produced. Some will be made both in a specifically tagged form and uniformly tagged form.

Among the services to be offered by the firm are performance of special syntheses and consultation and research involving applications of radiochemical techniques.

Bernard Wolnak, who is president of Mid-West Laboratories, will head the new company. Earl L. Whittaker, radiological chemist formerly with Nuclear-Chicago Corp., will be in charge of laboratory operations.

ZONOLITE PRODUCES NEW FARM CHEMICAL FILM

A 20-minute, 16 mm. sound movie has been produced by the Terra-Lite Div. of Zonolite Co. for showing to firms marketing agricultural chemicals.

Titled "Vermiculite, Carrier for Agricultural Chemicals," the film details properties of vermiculite as a carrier for insecticides, pesticides and herbicides. Production of vermiculite at company mines in South Carolina and Montana, and ag-chemical mixing techniques of the lightweight mineral are shown.

Information about free showings may be secured from Film Section, Zonolite Co., 135 S. LaSalle St., Chicago 3, Ill.

INNIS, SPEIDEN OFFICES APPOINTED SALES AGENTS

The Chicago and Cleveland offices of Innis, Speiden Co. Div. of Berkshire Chemicals, Inc. have been appointed sales agents in their territories for technical grades of magnesium carbonate and magnesium oxide produced by Keasbey & Mattison Co., Ambler, Pa.

For fertilizer manufacturers...

USP OFFERS 3 OUTSTANDING GRADES OF POTASH

Three grades of muriate of potash designed to meet the needs of fertilizer manufacturers! USP's Higran, the new specially-sized white granular, and Higrade muriate (both containing 62/63% K_2O)—the purest agricultural muriates now available. And Granular muriate of potash, too, containing 60% K_2O. All three are non-caking and free flowing throughout.

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FIRST BARGE SHIPMENT OF T
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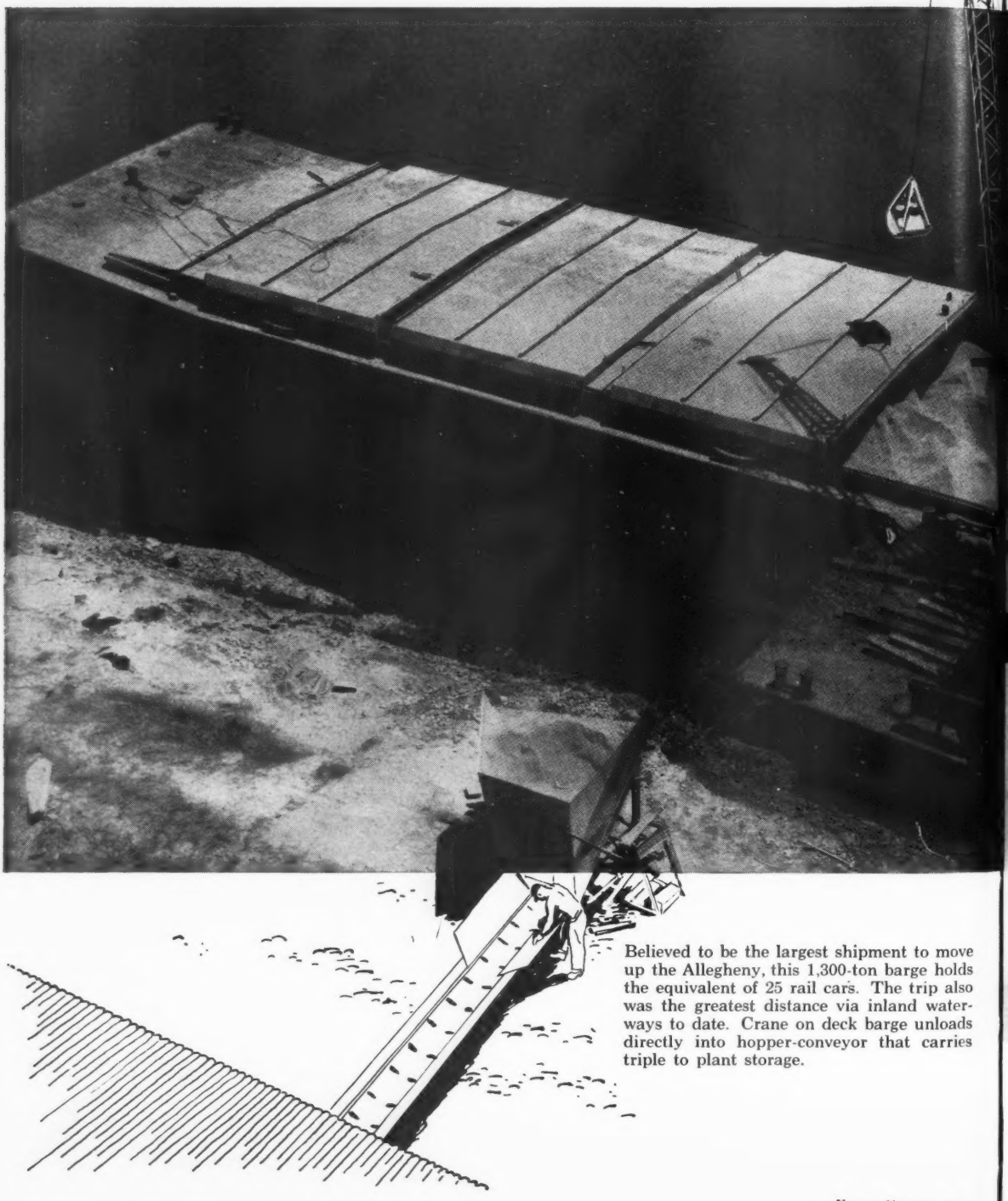


Believed to be the largest shipment to move up the Allegheny, this 1,300-ton barge holds the equivalent of 25 rail cars. The trip also was the greatest distance via inland waterways to date. Crane on deck barge unloads directly into hopper-conveyor that carries triple to plant storage.

TRIPLE SUPERPHOSPHATE KITTANNING PLANT

International's water-routing pioneers another first; pushes barges up the Allegheny River to slash shipping costs

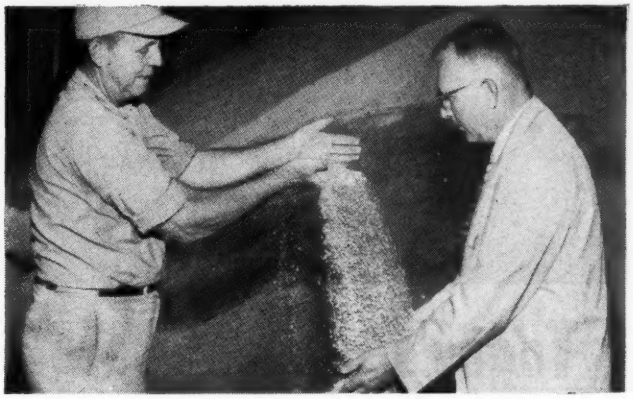
When this 1,300-ton barge of triple tied up at Kittanning, Pa., shipping history recorded another first . . . and costs at the Eastern States Farmers' Exchange plant took a substantial drop.

"International has proved that barge shipments to Kittanning are practicable," said J. Raymond Myers, production manager of Eastern States' Fertilizer Department. "This shipment of triple super brings immediate savings in shipping costs —savings that our plants at Cambridge (Mass.), York (Pa.), and Wilmington (Del.) already have been realizing."

For International, the 2,400-mile trip up the Mississippi, Ohio and Allegheny Rivers was a typical venture in water-route pioneering . . . still another example of service tailored to a customer's needs.

Why not share the benefits of International's attention to service and delivery . . . plus superior product quality. Write or wire for full information.

We'll be getting more of our triple by barge," says Kittanning plant manager Curtis H. Kelso, shown here examining International's barge-shipped triple. Consistent, uniform particle size keeps dust and setting-up problems to a minimum.



Eastern States has been a leader in high-analysis mixed goods. J. Raymond Myers, production manager of Fertilizer Department, right, and Clyde F. Grimm, manager of the York plant, check texture of their granular 8-16-16 fertilizer.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

PHOSPHATE CHEMICALS DIVISION .... 20 N. WACKER DRIVE, CHICAGO 6, ILL.

FARM CHEMICALS

— *Business & Management* —

NEW NITRIC ACID PLANT FOR MISSISSIPPI CHEM.

Owen Cooper, executive vice president of Mississippi Chemical Corp., has announced the award of a contract to The Chemical and Industrial Corp. of Cincinnati, Ohio, for design and construction of a 150 ton per day nitric acid plant.

The plant is to be located at their existing facilities in Yazoo City, Miss. and is the fifth nitric acid unit of high pressure design which has been installed by Mississippi Chemical.

CALSPRAY OPENS NEW QUALITY CONTROL LAB

Opening of a quality control laboratory for Calspray's recently completed $16 million fertilizer plant in Richmond has been announced by Leo R. Gardner, vice president and manager of the Research and Development Dept. of California Spray-Chemical Corp.

According to V. J. Tihenko, chief control chemist, the lab will be operated on a 24-hour basis under the supervision of lead control chemist, John C. Maier. It contains the latest scientific instruments for maintaining close chemical control of the processing of liquid or dry plant foods from the raw material stage on to the finished product.

V-C CLOSES 3 PLANTS

Fertilizer plants of Virginia-Carolina Chemical Corp. at Atlanta and Augusta, Ga., and Wadesboro, N. C. have been closed. The firm has also discontinued its Savannah and Atlanta, Ga. fertilizer sales offices.

The three plants were marginal ones, said Charles T. Harding, general manager of V-C's manufacturing department, and each was located near another V-C plant.

REPUBLIC CHEM. EXPANDS BALTIMORE FACILITIES

Installation of additional facilities at its Baltimore, Md., plant for production of Instant Powder Copper Sulphate has been announced by Republic Chemical Corp.

The company reports that the product is manufactured solely from copper refined at the plant in high temperature furnaces.

MERCK ACQUIRES 10 NEW RAILROAD TANK CARS

To speed up delivery of bulk organic chemicals to customers, Merck & Co., Inc., has acquired ten new railroad tank cars.

The blue, green and white tanks are made of stainless steel and lined with Lithcote, which imparts a hard, smooth finish to the interior. Merck said this latter feature greatly facilitates cleaning the tanks after they are emptied.

The company is currently using the new cars to ship formaldehyde, sorbitol and other organic liquid chemicals.

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. . . 3 Conveyors
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. . . Reinforced top edge
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FARM CHEMICALS People

California Spray-Chemical Corp. has appointed Ted Huggins as a public relations consultant. Huggins, who served for many years as a staff member of Standard Oil Co. of California's Public Relations Dept., will maintain an office in San Francisco's World Trade Center. He will work under Calspray's advertising and public relations manager, L. F. Czufin.

Calumet & Hecla, Inc. G. A. Houghton, Jr., formerly assistant general manager of the Forest Industries Div., has been named general manager. He succeeds his father, who has reached the company's normal retirement age.

Columbia-Southern Chemical Corp. Recent graduates now associated with C-S at Corpus Christi, Tex., include Frances M. Cummings, James B. Seaton, Lucene A. Corbitt, Tom C. Holcomb, and Oreste W. Lombardi, all chemists. Joining the firm as chemical engineers were Paul W. Leming, William M. Kunkel, Jr., and B. Lee Steele; Joseph R. Daley, as civil engineer; Ralph W. Darnell, electrical engineer; and J. Darrell Pritchett, mechanical engineer.

Crop Protection Institute. Dr. Elmer T. Palm, former graduate research assistant at Boyce Thompson Institute and Oregon State College, has joined the CPI staff as research plant pathologist.

Locating at the Durham, N. H., laboratories of the institute, Dr. Palm will be directly concerned with investigations of fungicidal modes of action, chemotherapeutic research and nematocidal investigations.

Diamond Alkali Co. promotions: C. R. Brown to director of labor relations; Albert J. Ingley to manager, employee benefits and salary administration; Glenn H. Varney to manager, employee recruiting and management development; Robert E. Frey to assistant works manager, Painesville; and Dr. Clifford A. Neros to group leader in the Product Development Section, Central Research Dept.

Four key executives were elected to new management assignments. A. H. Ingley, vice-president—manufacturing, becomes senior vice president; James A. Hughes, treasurer, is advanced to vice president—administration; Donald S. Carmichael, secretary, is named to the additional post of general counsel; and R. H. Armor, assistant treasurer, succeeds Hughes as treasurer.

Escambia Chemical Corp. Newly appointed assistant treasurer is Joseph J. Laputka, former vice president and treasurer and a director of R. M. Hollingshead Corp.

FMC International. Fritz von Bergen is named assistant manager, Chemical Operations Dept. of FMC International, a newly formed division of Food Machinery and Chemical Corp. His responsibilities will center around exploration and development of chemical opportunities in the international field.

Hercules Powder Co. K. P. Ewing, who retired in August from USDA, has been named to an advisory post with Hercules Agricultural Chemicals Div. Ewing's career in cotton insect control includes assignments at experimental stations in Texas and Louisiana since 1920.

Merck & Co., Inc. J. J. Simmons has been transferred to the Sales Dept., where he will be responsible for sales of Gibrel, Agri-Strep and other plant chemicals. J. W. Kennedy has joined the Market Planning Dept. as plant products manager. Kennedy was with USDA for several years and held the position of products sales manager for agricultural chemicals, Diamond Alkali Co., before accepting the Merck position.

Michigan Chemical Corp. Richard E. Brandt has joined the research staff, and is assigned to research in rare earth oxides and metals. Charles R. Jacoby has been added to the engineering research staff.

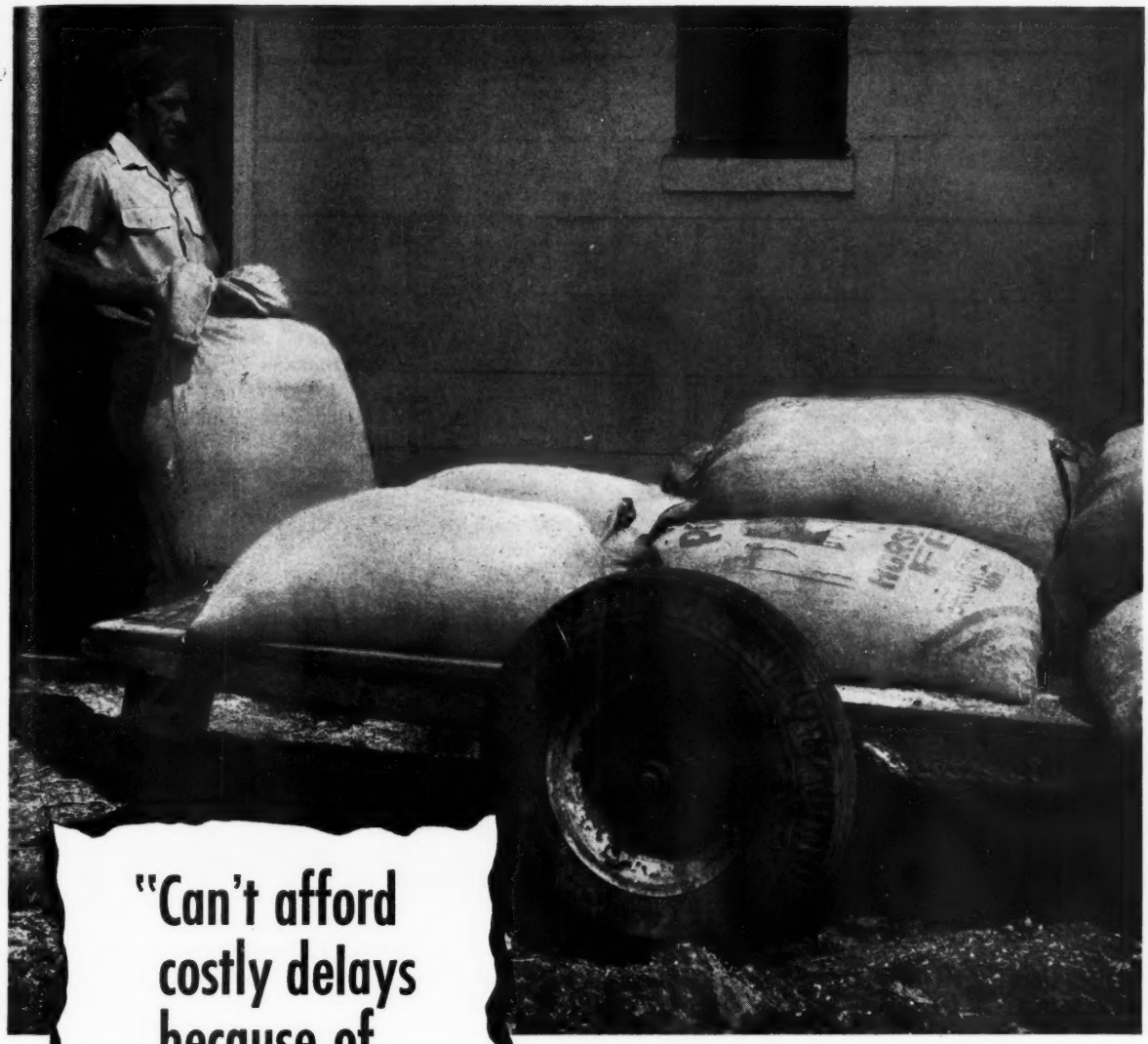
National Carbon Co. has named C. E. Ford to the newly-created position of new products marketing manager. He will be responsible for developing industrial markets for the products coming out of the research and development laboratories of the company.

National Plant Food Institute. Dr. Vincent Sauchelli, widely-known research scientist with a varied background in agriculture obtained both in this country and abroad, has joined the NPFI staff as chemical technologist.

Sauchelli

At present Sauchelli is concentrating his efforts on an NPFI-sponsored study of sampling and chemical analysis of fertilizer.

He began his career as chemical analyst with Arthur D. Little Laboratories. From this position he accepted a post as director of agricultural research with a British-Belgian rubber syndicate in the Federated Malay States. He joined Koppers Research Corp. in 1927, and moved to Davison Chemical in 1936 to spearhead the company's development and promotional program on granulated fertilizer. He was director of



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agricultural research for Davison.

Dr. Sauchelli organized the Fertilizer Industry Round Table and has served as its chairman for the past five years.

Nitrogen Div., Allied Chemical & Dye Corp. Garvin C. Matthiesen becomes assistant to the manager of fertilizer manufacturing sales. He is succeeded as midwest sales supervisor, Direct Application Materials, by Ernest M. Harper. Both men will be located at the company's main office in New York City.

Olin Mathieson Chemical Corp. W. B. Copeland has been appointed divisional vice president of the Plant Food Div. In his new position, the former Smith-Douglass Co. executive vice president will be concerned with all phases of agricultural chemical operations.

Clarke B. Ash goes to Olin Mathieson as assistant publicity manager, chemicals.

S. B. Penick & Co. George K. Nichols has been appointed a special sales representative for the Agricultural Chemical and Insecticide Div. Nichols will represent the entire line of the division in the middle Atlantic states, particularly New York, New Jersey, Pennsylvania and Massachusetts.

Nichols

Shell Chemical Corp. S. H. McAllister, director of Shell Development Co.'s Agricultural Research Div. at Denver, has been appointed to succeed F. W. Hatch, who is retiring as manager of Shell Chemical's Agricultural Chemical Sales Div.

McAllister will assume his duties at the firm's head office, New York, November 15. Hatch will retire Dec. 31, after completing more than 25 years' service with Shell.

Hatch

A native of Ashland, Ore., Hatch studied civil engineering at the Univ. of Calif. before joining Shell in 1932. With Shell, he has served as sales manager of the San Francisco marketing div. and later the Los Angeles marketing div., manager of the special products dept., joined Shell Chemical as manager of the agricultural products dept. and in 1952 became manager of the agricultural chemical sales div.

McAllister

McAllister received his A.B. and M.A. degrees in chemistry from Stanford Univ. before joining Shell Development in 1930 as an assistant chemist in Emeryville, Calif. After serving as a research chemist and department head, he became associate director in charge of process development and pilot plants at Emeryville and was later made associate director of petroleum technology. He assumed his present position and transferred to Denver in Sept., 1955.

Smith-Douglass Co. J. J. Pointer, manager of the Wilmington, N.C., plant, has just been named assistant sales manager for the company's eastern fertilizer div. Pointer has managed the Wilmington plant since 1952, after having supervised a central North Carolina sales territory from Raleigh for several years. In his new position, he will live in Norfolk.

Pointer

Dalrymple

John J. Dalrymple succeeds Pointer as manager of the Smith-Douglass Wilmington plant. He joined S-D in 1935 and has for many years supervised a North Carolina sales territory, living in Dunn.

Vernon S. Gornto retired July 31 from Smith-Douglass under provisions of the company's retirement plan. He was safety director, director of fire prevention and manager of the insurance dept.

Gornto was active in national safety circles, having been a charter member and later national chairman of the fertilizer industry safety group.

Stauffer Chemical Co. Promotion of James M. Werrell to district sales manager of the Ohio Valley territory, Industrial Chemicals Div., recently was announced. He will headquarter in Akron, Ohio. Robert M. Kent replaces Werrell as field sales representative in the Southeastern territory, with headquarters in Atlanta, Ga.

The Texas Co. Kerryn King has been named general manager of the Industrial and Public Relations Dept. He is succeeded as director of public relations by Thomas D. Durrance.

Union Carbide Chemicals Co., Div. of Union Carbide Corp. Aaron K. Stull, Crag agricultural chemicals sales representative, has transferred from the Rocky Mountain states to the company's Pacific Coast sales area. He will headquarter at his Riverside, Calif., residence.

Stull

Zonolite Co. has named James S. Tolon as sales representative.

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VIEWING WASHINGTON

with Farm Chemicals Washington Bureau

on agriculture

A multi-billion dollar dud--that's what some disenchanted government officials now are calling the formerly highly-touted Soil Bank acreage reserve. This year's total crop production emphasizes the failure of the reserve from the standpoint of reducing surplus production. Recent agriculture Department crop estimates indicate the final total farm output may at least equal the all-time record established in 1948 and again in 1956.

Secretary Benson himself reluctantly agrees that the reserve has failed to accomplish expected results. He has set up an internal USDA task force to study and come up with a substitute program. The Secretary, for the record, however, does not agree that it's a total bust. He estimates the reserve served to reduce corn and wheat crops by 200 million bushels each and the cotton crop by 2-3 million bales. It is difficult, however, to evaluate how much bigger these crops would have been without the acreage reserve.

Three official reasons are given for the failure of the acreage reserve--which pays premiums for retiring land from production of 5 major crops: (1) Farmers have contributed only poorest land to the program, used the best for production. (2) More farmers applied fertilizer, and employed improved farming practices than normally could have been expected. And (3) Despite Eastern drought and regional flooding, the weather turned out to be better than average.

The fertilizer industry is the beneficiary of a result of the acreage reserve which is expected to be permanent. Officials say it stimulated a broader awareness of the uses of plant foods which may have taken years by normal educational processes. Even though the acreage reserve may be ended next year--as the prospects now indicate--farmers who've newly discovered scientific fertilization aren't likely to forget it.

The new Benson Plan for agriculture now has been unveiled--at least as far as the general principals are concerned. It's a three-part package, and will be presented to Congress this winter. Here are the basic points:

(1) Price supports. The Secretary wants Congress to remove the "rigid" formula in the support law which forces price supports to go higher as supplies are reduced. He further will ask that he be permitted to drop any price support program on any crop. The latter part of the plan is primarily a matter of bargaining position at this time. He'll ask permission to drop supports, but expects to get rid of only the formula.

(2) Production controls. Congress will be asked for legal changes which will permit the Secretary to increase acre allotments, and make controls easier for farmers. This is is based on the belief that if farm prices are reduced,

VIEWING WASHINGTON

agriculture continued

farmers should be able to make up the difference in volume production. And--the lower prices and bigger supplies would result in bigger farm markets. While details of what specifically the Secretary has in mind are not available at this time, it would appear that larger acre allotments may turn to the benefit of the chemicals industry.

(3) Surplus disposal. Benson says he will ask for another extension of Public Law 480, the foreign surplus disposal program which was extended for one year last spring. Until the process of supply and demand really takes hold, according to present thinking, this program will be needed to syphon off probable production increases.

Sharp disagreements with the Benson plan developed at a recent meeting of the American Farm Economic Society. Benson's proposals are based on the principle that supply and demand will solve the surplus production problem. Consensus of the nation's top farm economists was that demand won't catch up with supplies farmers can produce until about 1975. While the economists felt that the increase in population, changing diets, possibilities for increased exports and other demand-increasing factors will help--they see little possibility that demand can be increased sufficiently to use all that farmers can produce. Dr. John D. Black of Harvard University, for example, estimates that farm production could be increased by as much as 86 per cent with known technology. This, he says, does not take into account effect of advances constantly being made in production research.

A new program for agriculture next year? Surprisingly enough, while most experts involved in such changes--lawmakers, farm leaders and government officials--are talking changes, the odds at present are against any. Because of the politics apparently inherent in agriculture, there is not expected to be any major legislation. For one thing, both parties will be playing to the voters ahead of the important 1958 congressional elections. For another, usual agricultural alliances within Congress are split wide open. Chairman Cooley of the House Agriculture Committee predicts no major changes--unless 4 major crop groups get together, cotton, corn, wheat and dairy. Most major legislation passed by Congress over the last 20 years has been the result of a loose coalition between two or more of these groups. The one apparent hope to bring these groups into one unified camp is the National Conference of Commodity Organizations. This new group is attempting to draw together all commodity interest in a common effort to improve programs. The theory is that if the commodity groups themselves can get together, they could in unison prevail upon the legislators to forget differences at least temporarily and get a job done.

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AAFCO CONVENTION PROGRAM ANNOUNCED

On October 18, members of the Association of American Fertilizer Control Officials will meet at the Shoreham Hotel in Washington, D. C. for their 11th annual convention.

During the morning session, they will hear FTC Commissioner Sigurd Anderson make "Some Observations in Connection with the Advertising and Sale of Fertilizers." AAFCO President J. D. Patterson, Salem, Oregon, will address the group, as well as Paul T. Truitt, executive vice president of the National Plant Food Institute. "Plant Hormones and Growth Stimulants" will be discussed by Dr. Paul C. Marth, senior physiologist, USDA, and "Commercial Aspects of Minor Elements in Fertilizer" by Dr. R. P. Thomas, of the Plant Food Div., International Minerals and Chemical Corp.

Dr. J. Richard Adams will lead off the afternoon session with a talk on "Liquid Commercial Fertilizers." Reports of investigators on such subjects as Nitrogen Products, Phosphorus, Potassium, Boron, Zinc, and Copper, Pesticides in Fertilizers, Specialty Fertilizers, Sampling Bulk Fertilizer, Registration Forms, Publications & Tonnage Reports, and other topics will complete the program.

1957 BELTWIDE COTTON MECHANIZATION CONF.

The program of the 1957 Beltwide Cotton Mechanization Conference will center around ways and means of expanding cotton markets to at least 20 million bales. The conference will be held Oct. 2–4 in Shreveport, La., at the Washington-Youree and Captain Shreve hotels. It is sponsored by the National Cotton Council in cooperation with Louisiana State University and other Cotton Belt land-grant colleges, farm equipment industry, USDA and other groups.

Since weed control methods continue to be a cost "problem child," a large part of the program will be devoted to this subject. A field demonstration will show the latest promising techniques in weed control from pre-emergence to harvest time.

PLANS ANNOUNCED FOR FERT. ROUND TABLE

Agenda for the forthcoming Fertilizer Industry Round Table, to be held at the Sheraton Park Hotel, Washington, D. C. has been announced by Vincent Sauchelli of the National Plant Food Institute, who is chairman of the Round Table.

The five half-day sessions will begin at 1:30 p.m. on November 6th and adjourn in the p.m. of November 8th. No formal papers are to be presented. This year's meeting will be devoted exclusively to a discussion of questions received from the membership.

Each session will concentrate on one and related phases of fertilizer manufacture. The first session will deal with standardization of raw materials; formulations, theory and practice; and chemical control. Session 2 is concerned with problems associated with ammoniation; session 3 deals with granulation; sessions 4 and 5 with manufacture of superphosphates, liquid fertilizers, plant effluents, instrumentation and maintenance.

More than 100 good, practical items will be discussed by persons selected by the membership for their known knowledge experience and general competence, said Dr. Sauchelli. Because of the large attendance of the past two years, the Executive Committee hit upon the plan of selecting about 30 persons to lead the discussion of items assigned and to stimulate additional discussion from the floor.

SALES CLINIC TO BE HELD OCTOBER 14

Chemical salesmen will be told "How to get that order" by three vice presidents of three of the nation's leading chemical companies during the sixth annual Sales Clinic of the Salesmen's Association of the American Chemical Industry. The all-day clinic will begin at 10:00 a.m. October 14 at the Hotel Roosevelt, New York.

Panelists for the morning program include E. E. Fogle, vice president of sales, Union Carbide Chemicals Co.; R. W. Hooker, senior vice president, Hooker Electrochemical Co.; and William H. McConnell, vice president of sales, Diamond Alkali Co.

Other morning session speakers and their subjects include Edward M. Krech, director of purchases, J. M. Huber Co., "A Purchasing Agent Looks at Salesmen"; Paul Mills and Bernard Roberts of Sales Power, Inc., "How to Communicate Your Ideas Effectively"; and Elmer Schumacher, retired general manager of sales for DuPont's Polychemicals Dept., "Selection and Training of Salesmen."

Luncheon speaker is General John E. Hull, president of the Manufacturing Chemists' Association.

Three concurrent panel discussions are scheduled for the afternoon session. Panel No. 1 will cover "Personal Development and Evaluation of Salesmen"; Panel No. 2 is on "Measuring and Reporting Territory Potential" and "What does a Salesman Expect from and Contribute to a Sales Meeting" is the subject of Panel No. 3.

The sales clinic concludes with a cocktail party and social hour.

Sam F. Teague, Jr., New York district sales manager, Inorganic Chemicals Div., Monsanto Chemical Co., is chairman of the SAACI Sales Clinic for 1957.

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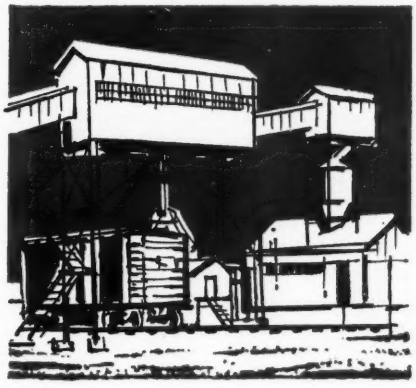

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CALENDAR

Oct. 2-4. Annual Beltwide Cotton Mechanization Conference, Shreveport, La.
Oct. 3. New Jersey Fertilizer Conference, Rutgers University, New Brunswick, N. J.
Oct. 3-5. Pacific Northwest Plant Food Assn. Annual Convention, Sun Valley, Idaho.
Oct. 7-8. Western Agricultural Chemicals Assn. Fall Meeting, Villa Hotel, San Mateo, Calif.
Oct. 14. Sixth Annual Sales Clinic, Salesmen's Association of the American Chemical Industry, Hotel Roosevelt, New York City.
Oct. 15. Annual meeting, Assn. of Official Agr. Chemists, Washington, D. C.
Oct. 17. Conference on Chemical Control Procedures, Shoreham Hotel, Washington, D. C. Sponsored by the National Plant Food Institute.
Oct. 17. (8 p.m. States Relations Committee) & **18,** The Assn. of American Fertilizer Control officials, Shoreham Hotel, Washington, D. C.
Oct. 21-22. Fertilizer Section, National Safety Congress, LaSalle Hotel, Chicago.
Oct. 29. Grassland Farming Conference, Rutgers University, New Brunswick, N. J.
Oct. 29-31. Entomological Society of Canada and Entomological Society of Alberta Annual Meetings, Lethbridge, Alb.
Oct. 31. Annual meeting, Middle West Soil Improvement Committee, Sherman Hotel, Chicago, Ill.
Oct. 31-Nov. 1. Southern Fertilizer and Southern Soil Fertility Conference, Dinkler Plaza Hotel, Atlanta, Ga.
Nov. 3-5. 34th Annual Convention, California Fertilizer Association, St. Francis Hotel, San Francisco.
Nov. 6-8. Fertilizer Industry Round Table, Sheraton Park Hotel, Washington, D. C.
Nov. 13-15. National Aviation Trades Assn. Annual Convention, Hotel Adolphus, Dallas, Tex.
Nov. 17-19. Annual Convention, National Fertilizer Solutions Assn., Netherland-Hilton Hotel, Cincinnati, Ohio.
Nov. 18-20. Carolinas-Virginia Pesticide Formulators Assn. fall meeting, Carolina Hotel, Pinehurst, N. C.
Dec. 2-6. 26th Exposition of Chemical Industries, New York Coliseum, New York City.
Dec. 2-5. Fifth Annual Meeting, Entomological Society of America, Hotel Peabody, Memphis, Tenn.
Dec. 3-4. Iowa State College Fert. Mfrs. Conf. and Fert. Dealers Short Course, Memorial Union, Iowa State College, Ames, Iowa.
Dec. 9-12. Chemical Specialties Mfrs. Assn. meeting, Hollywood Beach Hotel, Hollywood, Fla.

CFA PUBLISHES "RANGE FERTILIZATION"

A 24-page booklet, *Range Fertilization*, has just been published by the California Fertilizer Association's Soil Improvement Committee. It is designed to tell the story of the significant benefits which follow proper fertilization of dry range land, when employed with other approved practices.

Of "coat pocket" size, the booklet contains 16 photographs and brief text in large type for easy readability. Reports are made of increased meat production per acre, increased forage to the extent that extra hay can be put up, increased forage quality, especially in protein content, and longer grazing season—all through proper fertilization.

The booklet is being sold at less than cost to fertilizer registrants in the western states for their distribution to livestock producers.

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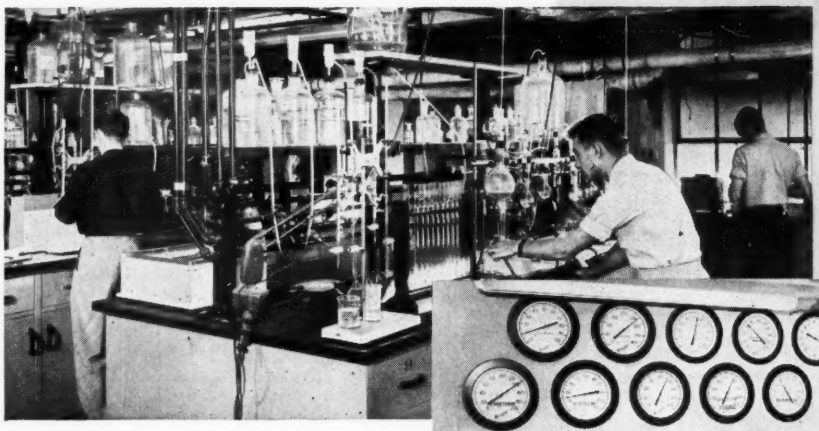

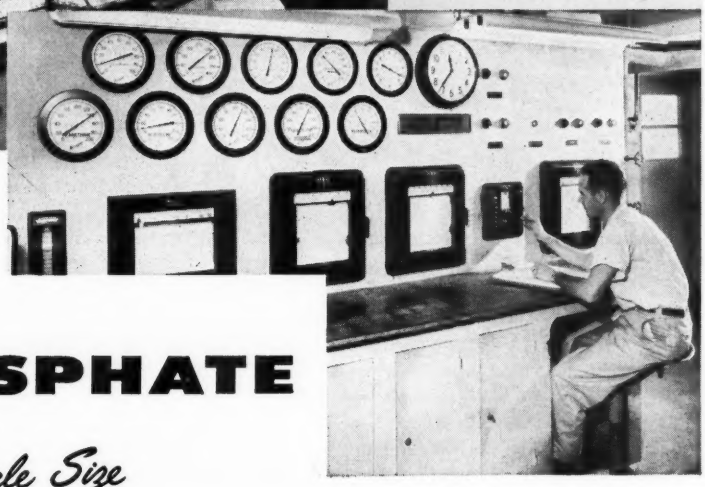

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NEW INSECT ATTRACTANTS SOUGHT

Natural and synthetic attractants to lure insects to their doom are being sought by research chemists and entomologists as modern weapons for more effective control of agricultural and other insect pests, USDA reports.

Effectiveness of three attractants has been demonstrated during the past year in the Mediterranean fruit fly eradication program operating in Florida. An attractant is also being used in the Federal-State plan to eradicate the gypsy moth from nearly 3 million acres of forest land in New York, New Jersey and Pennsylvania.

Success of the attractants now in use has encouraged the search for new natural and synthetic compounds that will prove effective not only for Medflies and gypsy moths, but for other destructive insect pests.

Chemists at USDA's Agricultural Research Center in Beltsville, Md., are searching for such compounds among hundreds of natural plant materials and organic synthetics. Several new and promising attractants have already been developed. Common weeds, obnoxious plants, familiar vegetables and flowers are among the plant materials being investigated.

Extracts of the plant materials are made in much the same manner that coffee is percolated. The materials—blossoms, seeds, leaves, stems, roots or the entire plant—are dried, ground to a powder and placed in an extractor with a solvent. As the solvent boils, its vapors rise above the raw materials to a water-cooled condenser and drop back in liquid form through the material just as water drips back through coffee grounds. The process continues for about 24 hours. Then the solvent is removed by evaporation and the extract remains.

Work with organic synthetics embraces an entirely different field of effort. Initial work with such materials, as is the case with natural materials, is done usually without prior knowledge that they may be attractive. But the development of one attractant from a given organic synthetic frequently leads to the development of other and sometimes more effective compounds from a related material.

An example is the initial discovery by USDA scientists that the propyl ester of the organic synthetic 6-methyl-3-cyclohexene-1-carboxylic acid was an attractant for male Medflies. Next, the isopropyl ester of this organic synthetic proved to be far more efficient than the propyl ester.

This compound was then made in commercial quantities, following actual field-testing in Hawaii. It was used in the Medfly eradication program until the more recent discovery of a third compound—the sec-butyl ester—from the same source. The sec-butyl ester has not only replaced the first two compounds, but is now being used to replace Angelica-seed oil, a natural attractant, as a lure with which to bait some 50,000 traps distributed throughout Florida.

In working with any organic synthetics, every possible chemical variation of an attractive material is tried and tested before the material is discarded. Thus, in some cases, 100 or more different related compounds may be made in the effort to make certain that no compound is overlooked. Careful records are kept, by a sort-card filing system, of each synthetic under test. Extracts of plant materials are also carefully recorded.

As each new natural extract or synthetic compound is made, it is tested in an olfactometer by the entomologists in Hawaii. In a screened room fruit flies are exposed to 12 materials mounted on a rotating wheel. After a specified period of time the insects drawn to each material are counted.

In this manner the attractant qualities of new materials are determined. Those that have such qualities are made up in larger quantities and sent out from Beltsville to field stations for testing under actual field conditions.

Most of these tests are made at USDA entomological research stations where there is opportunity to try out the attractants on different insects under field conditions.

1957 AGRICULTURE YEARBOOK PUBLISHED

Up-to-the minute information on soil care of use to home gardeners as well as farmers is emhasized in the 1957 Yearbook of Agriculture, recently published by USDA.

The book's 88 chapters were written by 142 scientists in the fields of soil management, botany, chemistry, horticulture, soil conservation, agronomy, irrigation and others.

Major attention is paid to soils and plant growth, plant nutrition and fertility, soil moisture, trace elements necessary for plants, applying fertilizers, principles of tillage, erosion, soil and insects and plant diseases, irrigation, soil management for main crops and the economic aspects of soil management. There also are chapters about soil management for home gardens and lawns, ornamental plants, vegetables, orchards, windbreaks, soil acidity and the bases of fertility.

One comprehensive section deals with soil management and needs in each of 16 regions of the U. S.

Copies may be purchased at $2.25 each from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Arcadian® News

Volume 2 | For Manufacturers of Mixed Fertilizers | Number 10

How to Save Money in AMMONIATION

New Ways to Cut Costs and Improve Output

More and more fertilizer manufacturers are producing better fertilizers at lower cost by initiating a few simple, inexpensive changes in their ammoniation methods, with the help of Nitrogen Division, Allied Chemical, Technical Service.

For example, proper selection of the correct nitrogen solution for the particular operation can effect substantial economies in many ways. A technical service man can help you choose the solution that fits your exact needs from the great variety of solutions developed and produced by Nitrogen Division.

Using the Nitrogen Division solution best adapted for specific fertilizer manufacturing programs can result in basic benefits.

1. *Lower cost per unit of nitrogen and other plant foods in the fertilizer.*
2. *Lower freight rates per pound of nitrogen in the more concentrated solutions.*
3. *Increased output of ammoniated superphosphate and mixed fertilizer in tons per hour from labor and equipment.*
4. *Fume reduction, resulting in reduced loss of nitrogen and better working conditions for labor.*
5. *Better physical condition of complete mixed fertilizers at lower production cost.*
6. *The use of more normal superphosphate and less triple superphosphate.*
7. *A low ratio of neutralizing ammonia to total nitrogen and less sulphuric acid requirement.*

Nitrogen Division, Allied Chemical, produces many different nitrogen solutions from which you can select those best suited to your ammoniation methods and equipment. It pays to use the right solution.

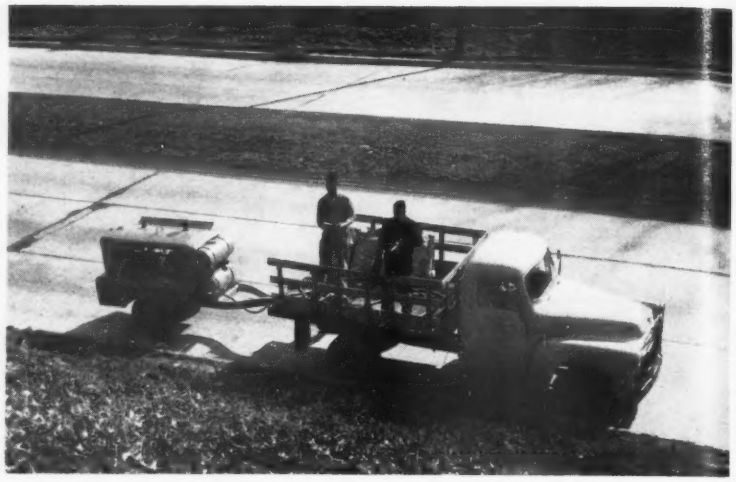
Nitrogen Division technical service men often suggest minor changes in equipment and operating methods to effect savings in ammoniation costs.

Simple adjustments, such as insulating pipelines and blowing back pipelines during non-operating hours in cold weather, have permitted the use of concentrated solutions winter and summer. This avoids expensive seasonal plant change-over and enables the manufacturer to use the same method of producing high-quality mixed goods throughout the year.

Efficient ammoniation involves proper technique, equipment and materials. Nitrogen Division offers a complete line of nitrogen solutions from which selections can be made adapted to particular conditions. Nitrogen Division technical service men are experts in ammoniation. They also have a thorough knowledge of the entire operation of a fertilizer plant. Their advice is free to customers.

Get the facts from your Nitrogen Division salesman . . . or contact Nitrogen Division, Allied Chemical, 40 Rector St., New York 6, N.Y. Phone: Hanover 2-7300.

Illustration at right shows how new methods are speeding roadside fertilization. Two men with air blast guns and a compressor, in addition to a truck and driver, apply granular fertilizer to 8 to 10 acres of roadside per hour. This encourages growth of turf, shrubs and trees, beautifies the right of way, prevents erosion, saves costly repair bills.



TONNAGE OPPORTUNITIES

ROADSIDE FERTILIZATION

Grass along our highways is a growing market for fertilizer. You can make this market grow faster by telling your local highway departments and road contractors about the benefits of fertilizer. The status of fertilizer use along highways is about where farm crop fertilization in the corn belt was 15 years ago. The market is ripe for development.

Thousands of New Acres

Our vast new highway program is adding thousands of acres of grassed roadsides every month. Most highway departments specify fertilizer for establishing grass, trees and shrubs. More and more of them are also learning that maintenance fertilizer applied every other year keeps established sod strong enough to prevent costly erosion, in addition to beautifying the roadside.

We have 380,000 miles of primary highways today, most of which are bordered by grass. Add to this the 41,000 miles of expressways, authorized by the new Federal Interstate Highway program, and roadside fertilization becomes a big tonnage market. Construction of these new roads over the next 15 years will require an average of 35 acres per mile. About a million acres of this will be seeded to grass and fertilized with complete fertilizer. And this grass will also need maintenance fertilizer. On better soils, this may be straight nitrogen; on poorer soils, mixed fertilizer will be needed. All in all, it is estimated that maintenance fertilizer for highways will amount to 250,000 tons per year.

Turf along many old roads needs maintenance fertilizer badly. The aim is to keep the sod vigorous enough to hold water, to prevent washing and to keep down weed growth, without getting such rapid growth of grass that more frequent mowing is required.

Arid land roadsides, of course, will not be fertilized. Areas of heavy rainfall and leached soil are the best market. But this includes most of the eastern two-thirds of the country, plus parts of the Pacific Coast. The new highways, with broader rights-of-way, and with more grading to expose poor subsoil, will need more fertilizer than older roads that followed ground contours.

New Methods and Equipment

Not all highway authorities realize the benefits of roadside fertilization in saving other maintenance work. Many of them do not know how to fertilize high cutbanks and steep ditches. New machinery and new methods of spreading fertilizer make these jobs fast and easy.

Roadside fertilization is only about 20 years old. A recent national survey shows that only 8 out of 41 states reporting gave a flat yes to the question, "Do you recommend fertilizer for maintenance?" Many are experimenting with the idea. Some states are going into extensive fertilization of grass as fast as they try out new hydraulic and air-blasting equipment and find out how well it works. At least 28 states are regularly using fertilizer along parts of their roadsides and in special trouble areas. Nearly all states use fertilizer to establish turf.

Granular fertilizer is the most popular for roadside application. It is easy to dissolve in water for hydraulic applicators. It handles and spreads well in air-blast equipment, and creates less dust.

Most states report using ratios of 1-1-1, 1-2-1, 1-3-1, and straight nitrogen fertilizer. A few have been using liquid fertilizer applicators. In acid soil areas of the South and the Northeast, lime is used in establishing grass, but seldom for maintenance. With the hydraulic method of application for new seedings, used in 20 states, lime, fertilizer, seed and water can all be mixed together and blown onto the soil, either before or after mulching, or with a mulch. For maintenance applications, the air-blast method is gaining ground, since no water supply is needed. The air compressor is hauled by the truck carrying the spreader crew. Two or three men in a two-gun crew can fertilize up to 8 or 10 acres of roadside per hour, reaching high cutbanks as well as steep slopes. Sanding trucks and regular agricultural fertilizer equipment are poorly adapted to roadside fertilization.

Use of fertilizer by highway departments is handled by maintenance engineers, right-of-way engineers or landscape engineers. The job of establishing new turf is done by contractors working under state specifications. You can promote highway turf fertilization in your area by contacting these men.

Useful Information

The American Roadbuilders Association and the National Plant Food Institute Roadside Task Force have assembled useful information that can help you sell this market. For details, write to Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

Many soils need LIME to make fertilizers pay!

To make sure your fertilizers produce maximum results, it will pay you to encourage your farmer customers to test their soils and use lime (or limestone) as needed. Lime reduces soil acidity. Lime also increases the availability of phosphorus to crops.

Throughout the humid areas, most soils are acid enough to need lime. This includes all states east of a line extending from the Red River in Minnesota to central Texas.

Yet, the tonnage of lime (or limestone) used by farmers today is down from its post-war peak in 1947. In Missouri, for example, farmers now spread only 2 million tons of lime per year, where they once used 3½ million tons per year. Over the country, farmers now apply only a third of the 78 million tons a year needed to maintain soil fertility for high crop yields.

Lime supplies calcium as a plant food as well as a means of reducing soil acidity. But many acid soils, especially those that are fertilized, supply enough calcium plant food for most crops except legumes. The great increase in the use of mixed fertilizers containing superphosphate supplies considerable calcium to the soil. Much of this is in the form of gypsum, which also provides sulphur, but does not reduce soil acidity. Limestone or lime is often needed to reduce soil acidity.

When soil is too acid to grow good crops, farmers often blame the fertilizer used for not producing expected results. In acid soils, soil bacteria action is slowed down. This speeds leaching of fertilizers and slows down release of plant foods from organic matter.

But the biggest disadvantage of soil acidity is its effect in making phosphorus unavailable to crops. This cripples fertilizer's ability to produce profitable yields.

Acid Soil Fixes Phosphorus

Among the many forms of phosphorus fertilizer materials, normal superphosphate is high in availability. Some phosphates are more soluble. Others, like rock phosphate, are only slowly available under any conditions.

Agronomist Firman E. Bear points out that "if a soluble phosphate is applied to acid soil, it loses its solubility almost immediately."

In our typical acid soils the highly-soluble phosphates are soon fixed in the soil by iron and aluminum to form compounds from which crops can get little or no phosphorus plant food. Ammoniated superphosphate in mixed fertilizers, however, has the phosphorus tied to calcium, so it is less apt to be tied up with iron or aluminum.

Agronomist Louis Thompson of Iowa State College says, "Phosphorus combined with calcium is more soluble than if combined with iron or aluminum."

That is why fertilizers containing ammoniated superphosphate have an advantage over fertilizers containing more soluble phosphorus in soils having high fixation properties.

Agronomist C. E. Miller of Michigan State College points out, "when water-soluble phosphates are added to the soil, rapid fixation occurs. It is rather generally assumed that liming is a valuable practice in liberation of fixed phosphorus and in prolonging the availability of applied phosphates in acid soils."

It will pay you to encourage farmers to test their soils regularly and apply lime or limestone as needed.

Lime provides the calcium to reduce soil acidity, so that less soluble iron and aluminum are present in the soil solution to tie up phosphorus. Most forms of phosphorus perform best when acid soils are limed enough to reduce acidity to a pH of 6 to 7. Since leaching and crop use of calcium may take 250 or more pounds of calcium out of the soil every year, it pays farmers to have a regular program of liming at least once during a crop rotation.

Many field tests have shown that liming soil has improved crop returns on corn and grain as much as $4 to $5 per acre. In a 5-year Ohio test with a corn, wheat and hay rotation, investment of $1.35 in lime per year per acre produced extra crops worth $14.78 in a clover rotation and $23.03 in an alfalfa rotation.

Apply Lime Any Time

Spreading limestone with dealer trucks during off-days and slow seasons is a good way to help your fertilizers pay off for farmers. Legumes need lime in the surface soil at seeding time. But for other crops, lime can be applied at any time before or after plowing. Fall is a good season for liming stubble ground and pastures. Your fertilizer will show better profits on limed land. When you sell fertilizer—don't forget lime!

NITROGEN *plus* SERVICE

There are many reasons why it pays you to deal with Nitrogen Division, Allied Chemical. You are served by America's leading producer of the most complete line of nitrogen products. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions for the fertilizer industry. You are assured of dependable supplies from three huge plants at Hopewell, Ironton, and Omaha. Your nitrogen is delivered to you by the best transportation facilities and equipment. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. Your sales are supported by the most powerful advertising campaign ever conducted to sell fertilizers. Nitrogen Division is your headquarters for NITROGEN *plus* SERVICE. Look over the big line and contact one of the 14 offices listed below.

Arcadian® Nitrogen Solutions

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®								
2	41.0	22.2	65.0	—	12.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	1.147	18	26
3	41.0	26.3	55.5	—	18.2	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	1.194	7	61
6	49.0	34.0	60.0	—	6.0	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	1.134	22	1
URANA®								
10	44.4	24.5	56.0	10.0	9.5	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	1.052	29	1
U-A-S®								
A	45.4	36.8	—	32.5	30.7	0.925	57	16
B	45.3	30.6	—	43.1	26.3	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	0.618	211	—

Other ARCADIAN® Nitrogen Products: UREA 45 • A-N-L® Nitrogen Fertilizer Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION Allied Chemical & Dye Corporation

MAIN OFFICE: 40 Rector Street, New York 6, N. Y., Phone: Hanover 2-7300

Branch Offices	Phone
Hopewell, Va., P. O. Drawer 131	Cedar 9-6301
Ironton, Ohio, P. O. Box 98	Ironton 8-4366
Omaha 7, Neb., P. O. Box 166	Bellevue 1464
Raleigh, N. C., 16 W. Martin St.	Temple 3-2801
Columbia 1, S. C., 1203 Gervais St.	Columbia 3-6676
Atlanta 3. Ga., 127 Peachtree St., N. E.	Jackson 2-7805
Memphis 9, Tenn., 1929-B South 3rd St.	Whitehall 8-2692
Columbia, Mo., P. O. Box 188	Gibson 2-4040
Indianapolis 20, Ind., 6060 College Ave.	Clifford 5-5443
Kalamazoo, Mich., P. O. Box 869	Kalamazoo 5-8676
St. Paul 4, Minn., 45 N. Snelling Ave.	Midway 5-2864
Los Angeles 5, Cal., 2999 West 6th St.	Dunkirk 8-3201
San Francisco 4, Cal., 235 Montgomery St.	Yukon 2-6840

Chemicals

275—C&E LAB SERVICES

A bulletin on "Agricultural Chemicals" from Crippen & Erlich Laboratories lists the various analyses and special services they carry out for the industry, along with prices for the work. A copy is yours if you

CIRCLE 275 ON SERVICE CARD

276—F.F. ABSORPTIVE CLAY

F.F. Absorptive Clay, available palletized, unitized or in granules, produces dry free-flowing 40 per cent concentrates of liquid or semi-liquid toxicants says National Kaolin Products Co. More information can be had concerning this highly absorptive clay. Just

CIRCLE 276 ON SERVICE CARD

277—PYRAX ABB

Coverage of the entire plant surface is necessary for adequate insect control, says R. T. Vanderbilt Co., manufacturers of Pyrax ABB. The Company states that this new diluent imparts flow and anticaking properties to dust mixes and promotes electrostatic dispersion of the dust cloud which assures just such coverage.

A copy of a new informative bulletin on Pyrax ABB can be yours, free, by just

CIRCLING 277 ON SERVICE CARD

278—BENEFITS OF SEED TREATMENT

A non-technical 16-page booklet telling of "The Benefits of Modern Seed Treatment" is available from Panogen, Inc. Illustrated with close to 50 pictures, the booklet contains information on when to treat seed, how the treatment works, history of seed treatment, and other related subjects. For your copy

CIRCLE 278 ON SERVICE CARD

How to use the

READER SERVICE CARD

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FREE INFORMATION to help you solve fertilizer, pesticide problems

Reader Service

279—STANDARD IS READY

Standard Oil Co. offers fast, reliable service and a full line of top-quality nitrogen products. They are ready to help you at any time from conveniently located plants with reserve tank cars always prepared to move out in response to your order.

More information on Standard's services to you can be had by

CIRCLING 279 ON SERVICE CARD

280—TRONA PRODUCTS

A complete 12-page products catalog and informational booklet has been issued by American Potash & Chemical Corp. Included are descriptions, properties and applications of nearly 70 chemicals marketed under the company's Trona trademark. If you'd like a copy,

CIRCLE 280 ON SERVICE CARD

281—CONTROL OF IRON CHLOROSIS

Greenz 26, a product of Crown Zellerbach Corporation, is a material that will help solve the iron chlorosis problem in plants. It is not a chelate, but does contain 4.5 per cent iron. For more information about Greenz 26 just

CIRCLE 281 ON SERVICE CARD

282—TERRACLOR BULLETIN

A colorful technical bulletin on Terraclor has just been published by the Olin Mathieson Chemical Corporation. Terraclor is a new fungicide recommended for the control of a number of crop diseases, primarily certain soil-borne types. A copy of this bulletin is available free by just

CIRCLING 282 ON SERVICE CARD

283—NEW CRAG MYLONE FOLDER

A new folder explaining how to use Crag Mylone is now available from Union Carbide Chemicals Co. Mylone is a new, powdered soil fumigant that needs no plastic cover. It acts as a herbicide, soil fungicide, and nematocide in pre-planting treatments on a variety of ornamentals.

For your free copy

CIRCLE 283 ON SERVICE CARD

284—TOLERANCE FOLDER

A wallet size folder containing a list of pesticide spray tolerances, giving time limitation in days before harvest on various crops, is available without charge from United-Heckathorn. The USDA provided the information which appears in condensed form in the folder.

CIRCLE 284 ON SERVICE CARD

Process Equipt.

285—NEWLY DESIGNED SPEED REDUCER

Many improvements are incorporated in the Ehrsam Style W Speed Reducer, claims J. B. Ehrsam & Sons Mfg. Co. Among them are easier running bearings, sturdy micrometal housings and heavy-duty worms and worm gears. The company has prepared a new catalog of its speed reducers containing complete descriptions and engineering data. For your copy,

CIRCLE 285 ON SERVICE CARD

286—The 'BIG PLUS'

A new, 20-page bulletin has just been released by Sprout-Waldron & Co. for use in the chemical, processing and pulp and paper industries. The booklet is a general introduction to the company's complete line of processing equipment. Utilizing the "Big Plus" theme, the bulletin shows how S-W equipment offers a combination of factors which provide the utmost in economy and efficiency. For your copy,

CIRCLE 286 ON SERVICE CARD

287—LARGE GEMCO CONICAL BLENDER

Gemco's new 315 cubic ft. conical blender will blend 10,000 lbs. of dry material in five minutes, reports General

Machine Co. of N. J. Electrical controls are mounted in the control panel with push buttons for Start, Stop and Jog. Dial pointers enable the operator to pinpoint the charging and discharging position on target. The power package is totally enclosed, all set on a common steel base and securely dowelled. It needs no maintenance or spare parts, says the maker. For more details,

CIRCLE 287 ON SERVICE CARD

288—LABORATORY MIXER

The New Marion Laboratory Mixer is designed for use in the laboratory or as a production machine, reports Rapids Machinery Co. A compact unit, it features the same "Marion" cross-blending mixing action found in their larger standard and industrial units. Capacity is 2 cubic feet or about 50 pounds.

For specifications,

CIRCLE 288 ON SERVICE CARD

289—EQUIPMENT BULLETIN

Bauer Bros. Co. describes its processing equipment in a new four-page illustrated bulletin. Included are magnetic separators, hammer mills, double and single disc attrition mills and single and double roll crushers. A copy of the bulletin will be sent to you if you

CIRCLE 289 ON SERVICE CARD

290—"JET-O-MIZER"

A new bulletin describing the heatless, motionless mill for processing heat sensitive organic toxicants is now available from Fluid Energy Processing & Equipment Co. The Fluid Energy "Jet-o-mizer" has no moving parts to generate heat because of the use of air as the elastic grinding fluid, says its manufacturer. For your free copy of this informative bulletin' just

CIRCLE 290 ON SERVICE CARD

291—NITROGEN SOLUTION SYSTEM BOOKLET

J. M. Tull Metal Co. has available a booklet on nitrogen solution system gauge glass fixtures. The booklet, "The Installation and Operation of a Nitrogen Solution System," includes information on their guaranteed leak proof connections as well as their entire system—complete or part unit.

For your free copy just

CIRCLE 291 ON SERVICE CARD

292—COLE TANK BOOKLET

"Tanks and Equipment for the Plant Food Industry" is the name of a booklet being offered by Cole Manufacturing Company. This booklet gives information on welded aluminum tanks in all sizes and types for nitrate solutions. You can obtain a free copy by

CIRCLING 292 ON SERVICE CARD

Materials Handling

293—CLARK FORK TRUCK

Addition to its line of a 10,000 lb. capacity, battery powered fork truck has been announced by Clark Equipment Co. Operational characteristics include a turning radius of 88 inches, minimum aisle for right angle stacking of 105 inches plus load length, and travel speed of 5.3 mph loaded. A dual hydraulic pump gives positive control of upright tilt and permits lift speeds of 23 fpm. Full information is available.

CIRCLE 293 ON SERVICE CARD

294—FUNCTIONS OF ACCUMULATORS

Yale Materials Handling Div. of Yale & Towne Mfg. Co. has published a bulletin describing the functions of an accumulator in the hydraulic system of an industrial lift truck. They say that when trucks are used over rough terrain, these devices have been found to reduce shock impact to the load and lifting mechanism by as much as one-half. For a copy of the bulletin,

CIRCLE 294 ON SERVICE CARD

Packaging

295—ST. REGIS 161-FB PACKER

This new valve bag packer offers a packing rate as high as 22 bags per minute of more compactly filled, smaller sized bags under one man operation, according to its manufacturer St. Regis Paper Co. The machine requires only 8 ft. 10 in. headroom, including built-in scale and 12 in. packer base.

For more information on the 161-FB valve bag packer and other St. Regis packaging services, just

CIRCLE 295 ON SERVICE CARD

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Miscellaneous

296—ENGINEERING BROCHURE

The Davidson-Kennedy Associates Co. has prepared a brochure which tells the history of the 70-year-old firm and describes their complete process engineering, procurement, and construction service.

For your copy of this free brochure just

CIRCLE 296 ON SERVICE CARD

297—SOLVING TRAMP IRON PROBLEMS

An illustrated catalog containing comparative performance charts and graphs showing how to select the exact type and size of plate magnet for a particular installation is now available from Stearns Magnetic Products. They say that "Magman," the line of magnets described, permits tramp iron separating efficiency up to 2½ times better than with ordinary units. For a copy of the catalog, presenting complete specifications,

CIRCLE 297 ON SERVICE CARD

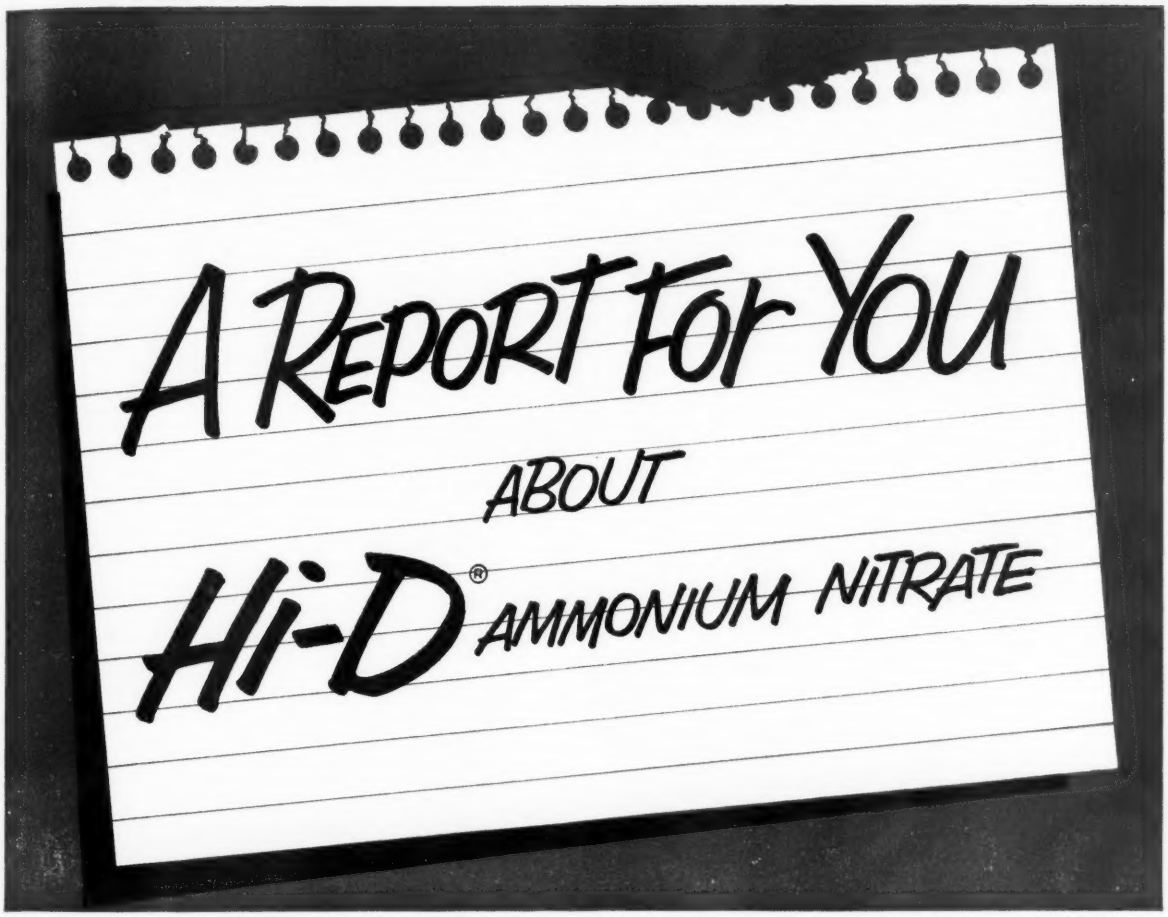
298—POCKET pH METER

The Pocket pH Meter is ideal for fertilizer salesmen, farmers, florists and gardeners who need quick on-the-spot information on soil pH, says Beckman Instruments Inc. Weighing only 2 pounds, it features unique combination glass and reference electrode and is powered by six flashlight-type batteries. For more information,

CIRCLE 298 ON SERVICE CARD

See pages 47 and 48 for information on these Reader Service Numbers:

299—Southland Packer
301—Drum Handling
300—B&L Autobatch
302—Hough Paymover
303—Safety Equipt. Catalog



DEALERS PREFER Hi-D

"The rapid acceptance and demand for Hi-D was amazing."

"Hi-D is a better product in good bags."

"Arrived in better shape and stored better for a longer period."

"First time farmers have ever specified a brand of ammonium nitrate."

"Hi-D bags stand out well in warehouse. Farmer notices them as soon as he walks in."

"We've had really good reports about the product from our Hi-D customers."

"When farmers asked for ammonium nitrate, we sent them Hi-D. We were surprised at the number who insisted on Hi-D when they re-ordered."

"The spring advertising campaign sure built farmer recognition for Hi-D."

FARMERS PREFER Hi-D

"Really prefer the Hi-D granules in our field machinery over other kinds of ammonium nitrate."

"The men all like the way Hi-D handles. Hi-D throws nicely. What we don't use at once stores very well."

"Best moisture-proof bag I've ever seen. Used Hi-D on coastal Bermuda grass and corn, plus oats and rye in winter. A really free-flowing material, you never get too much or too little. Hi-D is always in good condition even after storing."

PILOTS PREFER Hi-D

"Hi-D arrives dry and stays dry. Flows evenly from start to finish. Plane hopper holds up to 25% more material. Saves me air time."

"More pounds of Hi-D in the hopper saves air time. Really flows nice. Fly at 30 feet with prills, 36 feet with Hi-D which means fewer times through a field, more profit per job."

"Hi-D is always dry when we open it. Flows regularly from start to finish – no bridging in the hopper. Shuts off fast. No bind due to dust."

IT'S EASY TO SEE THAT
IT'S EASIER TO SELL Hi-D!

A PRODUCT OF **COMMERCIAL SOLVENTS CORPORATION** 1817 WEST FULLERTON AVENUE, CHICAGO 14, ILL.
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THE MAN WITH THE MULTIWALL PLAN

UNION PACKAGING ENGINEER ROBERT BOLLING

cuts 60 sizes from inventory of 20-million-Multiwall user

Impressive savings in cost, space, handling and inventory control

A leading manufacturer of plant food has simplified his Multiwall inventory problem, reduced his packaging costs, released valuable storage space, and saved an impressive number of man hours by revising the Specifications Manual which guided his company's purchase of 20 million bags a year.

Union Multiwall Recommendations are based on this 5-point Packaging Efficiency Plan

- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

The opportunities for more efficient control were first pointed out by Packaging Specialist Robert Bolling of Union. With the consent of the manufacturer, Bolling then surveyed the company's complete bagging operation. The new Specifications Manual was one of the results. Savings are expected to run well over $100,000.

Union Multiwall Specialists have helped many companies effect substantial economies and gains in Multiwall performance. Ask about Union's 5-Point Packaging Efficiency Plan, and how you can take advantage of it without either cost or obligation.

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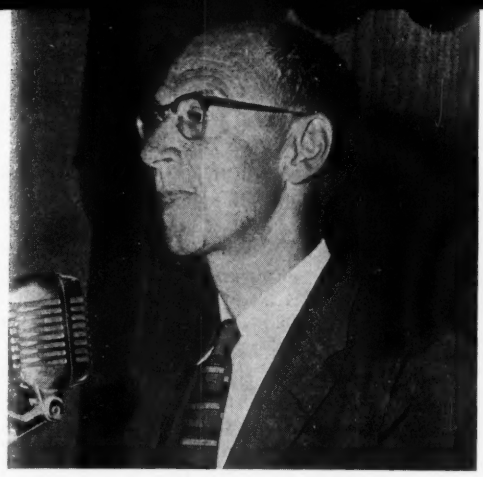

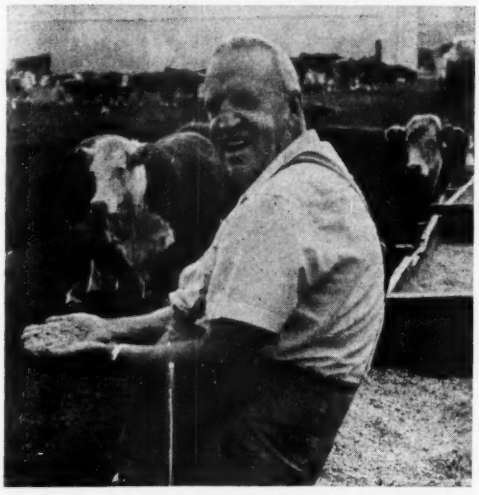

24TH ANNUAL NAC MEETING

MORE SALES— BIGGER PROFITS

HOW much can we sell?" and "How can we sell it?" seemed to be two questions that everybody wanted answered at the 24th annual meeting of the National Agricultural Chemicals Association held at Spring Lake, N. J. last month.

Whether they got specific answers or not is questionable, but the program speakers gave them enough to think about and analyze for the next few months.

For instance, Dr. Vergil D. Reed, an economist for the J. Walter Thompson Company said, "Our growing population and purchasing power indicates a rapidly expanding demand for farm production in the foreseeable future."

Dr. Reed said the demand for farm products is expected to rise steadily over the next 20 years and by 1975 the demand is expected to be at least 40 per cent greater than it was in 1950. He predicted that most of the increased production necessary to meet the demand would come from "greater productivity through further mechanization and better methods" on the farm.

"Yields per acre, as well as per man hour," the New York economist declared, "will increase considerably, making it unnecessary to expand acreage under cultivation appreciably." He said an increase in productivity of around 85 per cent between 1950 and 1975 is technically possible and economically feasible.

The advertising and marketing executive said that "our economy is so strong, vital, and dynamic that it has grown miraculously." For an example, Dr. Reed pointed to the chemical industry. Tracing its phenomenal growth from the turn of the century to the

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William H. Prigmore, assistant general manager, Eastern States Farmers' Exchange.

Roswell Garst, Garst & Thomas Hybrid Seed Corn Co.

Dr. Vergil D. Reed, J. Walter Thompson Company.

Lea Hitchner, executive secretary, NAC.

present, he remarked, "that kind of growth can continue for many years to come, deeply rooted in a rich expanding market."

Pointing to the marketing opportunities for industry, Dr. Reed said that growing "with America is largely a matter of knowing how America will grow and change, then keeping a step ahead of the tide. Yours should be a great tomorrow."

Not so optimistic, however, was Roswell Garst, partner in the firm of Garst & Thomas Hybrid Seed Corn of Coon Rapids, Iowa, who declared that the present agricultural situation needed some sobering appraisal. He granted that the population increase has been phenomenal and predicted that the U. S. could quite possibly double its population during the last half of this century. But despite this great increase in the number of mouths to feed, Garst said "agricultural production has grown at twice the rate of population during the past 10 years, in fact production is 10 to 15 years ahead of population right now."

And as a note of warning Garst reminded the farm chemicals group that "it is important for the farm chemicals industry to realize what a stake it has in the farmers' prosperity." Don't take these population increase figures too seriously he warned and added "it will be a long time before population catches up with agricultural production."

Garst, who is pretty well-known in beef cattle circles also, said he didn't have the answers to the problems in agriculture but he did have a couple of recommendations that might help. One of these was a plea for a better export program involving our surplus food. He said he would like to see us exporting food to some of these areas where sufficient amounts of protein and fats are unknown in the diet. Specifically he mentioned the areas of China and India.

His other suggestion was that industry spend a little more money on market research and less on production. He commented that the farmer has demonstrated his ability to raise crops in abundance —now let's help him sell it.

William H. Prigmore, assistant general manager of Eastern States Farmers' Exchange, Inc. in West Springfield, Mass., described his co-op's credit policy and emphasized that farmers dealing with the co-op pay cash for their purchases because they have been trained to do so.

The company, which did $86 million in business last year, has only one alternative to cash and that is a seven-day allowance between delivery and payment time. To assure adherence to this policy, this co-op charges a 2 per cent penalty on all accounts that run over the seven-day period.

Another highlight of the last meeting to be held at Spring Lake for awhile was the panel presentation by Dr. Joe Bohlen and Dr. George Beal, Iowa State College, on "What Motivates Growers to Buy Pesticides." For a complete story on this see page 35.

Fred Hatch in his final speech as NAC president pointed out many of the changes in the association undertaken to cope with the changing structure of the farm chemicals industry. Perhaps the most important of these is in the area of public relations, where a 35 per cent increase in the association budget has been used to expand promotional and protective activities.

With reference to Miller Bill Mr. Hatch said that after several years under the law it appears that both industry and government agencies have been deviating from some of the procedures which were intended at the time the bill was drafted. Mr. Hatch continued, "We believe that the Miller amendment would work more satisfactorily for industry, agriculture and the government if the procedures and principles were more closely followed. The government agencies involved have indicated their willingness to review these matters with our industry and to seek a mutually satisfactory solution."

Jackson V. Vernon, President, Niagara Chemical Division, Food Machinery and Chemical Corporation, Middleport, N. Y., was elected President, and Charles H. Sommer, Jr., Vice President, Monsanto Chemical Company, St. Louis, Mo., was elected Vice President of the association.

Mr. Vernon served during the past year as Vice President of the Association. He succeeds Fred W. Hatch, Manager, Agricultural Chemicals Division, Shell Chemical Corporation, New York City, as Association President. Mr Sommer has been a member of the Association's Board of Directors for the past three years.

Three new members also were elected to the Association's Board of Directors. They are: George R. Ferguson, President, Geigy Agricultural Chemicals, Division of Geigy Chemical Corporation, Yonkers, N. Y., John O. Logan, Vice President-General Manager, Industrial Chemical Division, Olin Mathieson Chemical Corporation, Baltimore, Md., and Warren H. Moyer, President, Chipman Chemical Company, Bound Brook, N. J.

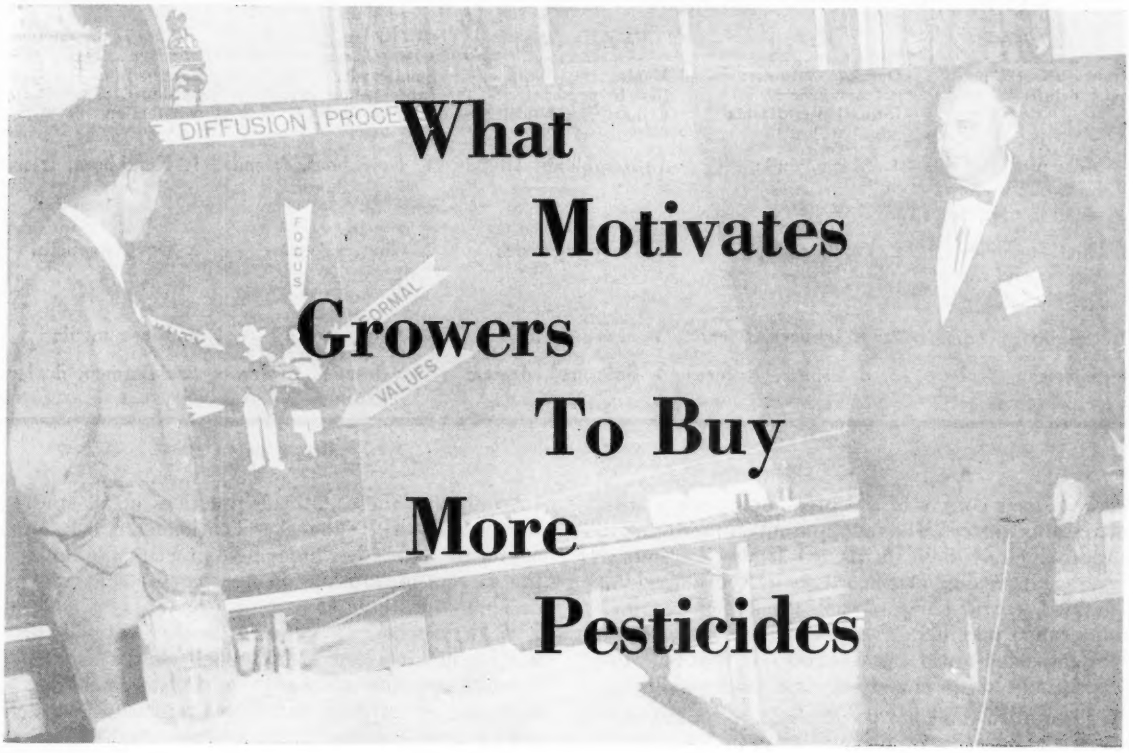
Two long-time officials of the U. S. Department of Agriculture's Agricultural Research Service were honored by the presentation of special merit scrolls during the National Agricultural Chemicals Association's annual meeting.

The men are Dr. W. G. Reed, who retired August 31 as Head, Pesticide Regulation Section, and K. P. Ewing, who retired on August 31 as Head, Division of Insects Affecting Cotton and Other Fiber Plants.

During Dr. Reed's administration the Insecticide, Fungicide and Rodenticide Act of 1947 was enacted, and later the Pesticide Regulation Section was given USDA functions in assisting in the operation of the Miller Pesticide Residue Amendment to the Food, Drug and Cosmetic Act, enacted in 1954. These are the major federal laws governing the registration of pesticides and certification for use on food crops.

Mr. Ewing, a research entomologist with USDA for 37 years, has made outstanding contributions to improve the yield and quality of cotton through development of better insect control methods. He was awarded USDA's Superior Service Award in 1949 for this work, and was named Texas' "Man of the Year" by a southern farm paper in 1950 for his outstanding service to agriculture.

The next meeting of the association will be held in October, 1958 in Augusta, Georgia. ▲



What Motivates Growers To Buy More Pesticides

by Dr. Joe M. Bohlen
and
Dr. George M. Beal
Iowa State College

THE data on how farm people accept new ideas are presented in the framework of two over-all generalizations. The first of these generalizations is that the process by which people accept new ideas is not a unit act, but rather a series of complex unit acts—a mental process. The research seems to indicate that this mental process consists of at least five stages. Evidence supports the belief that individuals can distinguish one stage from another and can designate points in time when they went through each stage. The stages in this mental process are awareness, interest, evaluation, trial and adoption. See Table 1.

These then are the stages in the mental process of accepting new ideas and practices. Individuals may go through these stages at different rates, and any given individual may go through these stages at different rates depending upon the practice itself. The complexity of the practice seems to be a major factor in determining the rate and manner with which people go through these mental stages.

The following is a categorization of ideas based upon their complexity.

DIFFERENCES IN COMPLEXITY OF PRACTICES

The simplest of these categories is a *change in materials and equipment*, such as increasing the use of fertilizer from 100 pounds per acre to 200 pounds.

The second in complexity is an *improved practice*, which involves a change in technique. An example would be switching from broadcasting fertilizer to side-dressing.

The third category of complexity is an *innovation*. An innovation is a change which involves not only a change in materials but also a complex of changes with regard to their use. An example is the use of hybrid seed corn. On first thought, the use of hybrid seed corn might appear to involve only a simple change in materials or equipment in this instance materials. But the adoption of hybrid seed corn involves a much more complex change. It involves a different framework for obtaining the seed. In many rural communities farmers had attained status and satisfaction from being good judges of seed corn. When they adopted hybrid seed, they had to give up this status and the prestige attached to it. Once

TABLE 1. THE ADOPTION PROCESS AND SOURCES OF INFORMATION

Awareness	*Interest*	*Evaluation*	*Trial*	*Adoption*
Knows about it; lacks details	Develops interest; gathers general information and facts	Mental trial; application to personal situation: Can I do it?	Small-scale, experimental use: How to do it!	Large-scale, continued use; satisfaction
1. Mass media: Radio, TV, newspapers, magazines	1. Mass media	1. Neighbors, friends	1. Neighbors, friends	1. Neighbors, friends
2. Govt. agencies: Extension, voc. ag, etc.	2. Govt. agencies	2. Govt. agencies	2. Govt. agencies	2. Govt. agencies
3. Neighbors, friends	3. Neighbors, friends	3. Mass media	3. Mass media	3. Mass media
4. Salesmen, dealers	4. Salesmen, dealers	4. Salesmen, dealers	4. Salesmen, dealers	4. Salesmen, dealers

hybrid seed corn was accepted, other seeds which fitted this pattern were adopted much more rapidly. Approximately 5 years passed from the time the average individual first heard about hybrid seed until he tried it, and 13 years passed before the majority of farmers adopted it. Now, when a new hybrid variety is developed, farmers go to get seed before the experiment station even has time to propagate it.

The fourth category of complexity of practices is a *change in enterprise*. This involves many innovations. An example is a change from a dairy herd to a beef cattle herd.

Another factor associated with complexity of practices and ideas is the cost. Those practices which cost little seem to be adopted more rapidly than those which are more expensive. From another point of view, those practices which yield the greatest marginal returns per dollar invested, and in the shortest time, seem to be adopted most rapidly. For example, when a farmer was questioned regarding the trial stage in the use of 2,4-D for field weed control, he answered that he had bought a 69-cent can and tried it on his wife's flower garden. This example points out something else. This individual combined the evaluation and trial stage in his own mind. If this same individual were changing over from a stanchion-type dairy barn to a milking parlor and loafing shed type of dairy arrangement, he probably would spend a great deal of time at the evaluation stage. Even though he might take a questioning attitude after installing this new equipment, he would realize that in reality he has no trial stage because once he installs the milking parlor, he cannot afford to change again.

THE SOURCES OF INFORMATION

The research indicates that the five stages dealt with earlier in this paper are not merely theoretical, but actually are real in the minds of farm people. Evidence shows that people use different sources of information at the various stages in this mental process. Table 1 shows the sources from which the largest number of people said they obtained information at the different stages in the diffusion process. In compiling these data all practices in all studies were combined. The classifications are based on aggregate data. For any single practice the rank of the sources of information may not be the same as designated in table 1.

At the *awareness stage* more people mentioned first hearing about a new idea through mass media than through any other source. Operationally, mass media were defined as those sources of information which were available to the public, such as radio, TV, newspapers, farm magazines, and other forms of commercial publications. This category does not include publications issued by government agencies, which individuals obtained by request. Neither does it include information published by commercial concerns in their house organs, which farm people recognize as coming from that source.

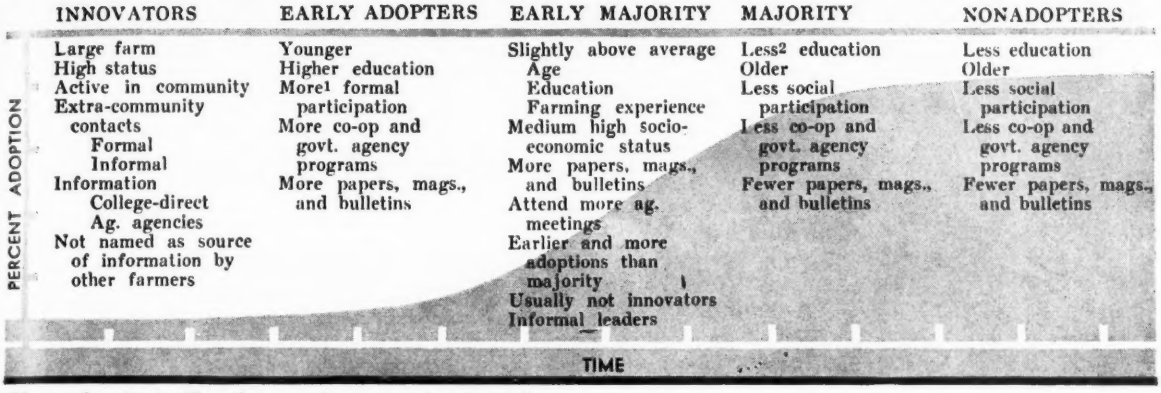
The second most important source of information in terms of making people aware of new ideas was government agencies. This category includes the Extension Service, which was by far the most important, the Soil Conservation Service, Vocational Agriculture and Vocational Homemaking, ACP and PMA, and other government agencies. Next in importance were neighbors and friends, and least important were salesmen and dealers.

At the *interest stage* the greatest number of individuals said they obtained their information from mass media, and government agencies were a close second. Neighbors and friends ranked third, and salesmen and dealers fourth.

At the *evaluation stage*, neighbors and friends were mentioned most frequently. When farmers were attempting to make their decision, they relied more on neighbors and friends than any other source. Government agencies ranked second, mass media third, and salesmen and dealers fourth.

At the *trial stage* the data are not as definitive as at the other stages. However, the rank order as indicated by the studies is neighbors and friends first, government agencies second, mass media third, and salesmen and dealers, again last. At this stage farmers seem to rely upon mass media for information regarding when to apply the practice and upon sales-

FIG. 1. SUMMARY, ADOPTION CURVE AND TIME CATEGORIES



[1]More refers to significantly more than categories *that follow.*
[2]Less, older, fewer refer to significantly different from *previous* categories.

men and dealers for technical help regarding handling of the equipment.

At the final, or *adoption stage*, neighbors and friends, government agencies, mass media and salesmen were ranked in that order. In over 90 per cent of the cases studied, individual satisfaction with the idea was the most important factor in continued use.

In all stages the complexity of the idea is related to the choice of sources. The more complex the idea, the greater is the tendency to rely on government agencies.

When people are making a decision to adopt an idea, they apparently rely on sources which they consider to be objective. Neighbors and friends and government agencies evidently rank high as valid sources of information. Farmers seem to suspect mass media and salesmen and dealers of pushing an idea mainly for the purpose of selling a product.

DIFFERENCES AMONG INDIVIDUALS

The second major idea of this paper deals with the fact, obvious to most readers, that people do not adopt new ideas at the same time. Some people adopt ideas when they are first introduced; others wait a long time; while some never adopt an idea.

Figure 1 summarizes the data related to this second major idea. The horizontal axis of this figure indicates the time at which a new practice was adopted. The vertical axis indicates the percentage of people who have adopted an idea. Running across the figure is the adoption or diffusion curve. This is a cumulative curve so that at any point on the curve its height represents the total percentage of people who have adopted an idea up to that time.

There are no absolute values on either the time or per cent adopting axis. The time span over which people adopt a new idea will vary from practice to practice. For instance, after hybrid seed corn had been on the market 15 years, approximately 98 per cent of the farmers had adopted it. Perhaps the vast majority of people would adopt another practice in 5 years. Also, quite possibly a given practice might apply to only 30 per cent of the people. In the case of hybrid seed corn nearly 100 per cent adoption might be expected.

Examination of the diffusion curve shows that it is an S curve, which is close to a normal growth curve. There is a slow gradual rate of adoption, then quite a rapid rate of adoption, followed by a leveling off of the adoption rate. If this were a simple distribution curve instead of a cumulative curve, it would approach a normal bell-shaped distribution. For most practices the adoption curve either fits the normal growth curve pattern or approximates it.

The research shows significant differences in selected personal and social characteristics when people are categorized according to time of adoption. Five categories are listed: innovators, early adopters, early majority, majority and nonadopters. (See Fig. 1). Although there may be additional categories, the categories presented will serve as tools in analyzing the people with whom you work in terms of their probable rate of adoption. While these data apply to farm practices, other research indicates that similar categories are found in the diffusion of other kinds of practices, for instance, the adoption by medical doctors of the so-called "wonder drugs."

CONCLUSION

In concluding this brief summary of the diffusion process, it should be emphasized that this is only a progress report. Most of the research to date has been broad and general rather than specific and penetrating. However this broad, general research has provided information for a number of generalizations, some of which were presented. The great need for more specific research in various areas discussed in this paper is evident. It is encouraging to note that much research is being done by sociologists and by other groups interested in the diffusion process, not only in the area of farm practices but also in other areas.

The material in this article is adapted from a speech given by Dr. Bohlen and Dr. Beal at the 24th annual convention of NAC and from a publication entitled "The Diffusion Process," Special Report No. 18, Extension Service, Iowa State College.

NEW DIMENSIONS IN PLANT GROWTH

While this picture may demonstrate one of the "sensational" characteristics of gibberellic acid, scientists are opening new avenues of usefulness and practibility for what has been called "perhaps the most versatile and important plant growth regulator yet discovered."

WHEN the gibberellin family of plant growth regulators jumped from a long obscurity in Japan to sudden worldwide prominence, it touched off a remarkable example of cooperative research and teamwork among American plant scientists, both in state and federal agencies and in private business.

Back in May FARM CHEMICALS printed a history of the gibberellin family and some of the preliminary results obtained by Dr. S. H. Wittwer of Michigan State University. In view of the vast amount of research being carried on at the present time and the volume of publicity devoted to the "miracle growth-booster" the editors felt that a progress report on what has happened up until now would be of prime importance to the farm chemicals industry.

"How does gibberellin work, chemically and physically?" the scientists are asking. What is its effect on germination growth, flowering and yield of different plants? How and when should it be applied? Will it pay a farmer to use it on his crops?

Some of the answers are beginning to appear: Gibberellin treatments can produce bigger grapes in longer, looser bunches. They can act as a substitute for chilling to speed up the flowering of some vegetable and ornamental crops. In seed potatoes, gibberellins can break the normal rest period and cause rapid sprouting. The new chemical can also boost the early growth of citrus seedlings and can cause a renewal of growth in some older stone fruit trees.

Basic Studies in U. C. and Cal Tech Labs

Basic research with gibberellins is aimed at finding where the substances occur in natural forms and how they function in plants. Microscopic amounts of the substances can double the size of a tomato plant, the scientists have found; yet gibberellins couldn't kill the plants, even with doses as large as 4,000 parts per million.

Some of the pioneer basic work was carried out (and is continuing) on the Los Angeles campus of the University of California. In 1955, Bernard Phinney of the botany staff at U.C.L.A. found that dwarf corn could be stimulated by gibberellic acid to reach the size of normal corn and to resemble it closely in most other respects. He reasoned from this work that the dwarf corn varieties lacked some kind of growth-inducing substance, probably a substance resembling gibberellins. Later, he was able to isolate such a substance from normal corn seed in the "milk" stage which, when applied to dwarf corn, brought about the same kind of stimulation as gibberellic acid. The U.C.L.A. scientists are now attempting

to isolate pure forms of these "natural gibberellins" from extracts of bean seed and wild cucumber fruit for chemical analyses.

Meanwhile, Botanists Anton Lang and Roy M. Sachs of the U.C.L.A. staff have shown that gibberellins boost plant growth by stimulating a more rapid cell division, as well as by "stretching" or elongating plant cells. These scientists observed a 1,000 per cent increase in the number of cells at the tip of a plant treated with the new chemical.

Botanists on the University's Davis campus are using a radioactive tracer technique to learn how gibberellins are absorbed by plant leaves and translocated through stems and roots. The Davis botanists—C. Ralph Stocking, Herbert B. Currier, Mahmood Clor, and James Pallas—intend to treat plants with special radioactive gibberellins, then prepare the plants by a freeze-drying process. Afterward, radioautographs will be made—that is, the plants will be placed on X-ray film and will "take their own pictures" showing how the ray-emitting chemical has moved through the plant system. Such factors as light, temperature, humidity, and the action of surface agents will be observed.

Vegetable Crops Research

Vegetable crops researchers at the University of California's Davis and Riverside campuses are investigating the new chemical that "makes plants grow big," but they're finding some other effects of gibberellins even more interesting. Sometimes, they point out, giant plants are not what the grower wants; speeded-up germination, flowering, and fruit set might be a lot more useful to him.

Take potatoes, for instance. Nature gives seed potatoes a natural rest period, but the farmer wants them to sprout in a hurry and produce a good stand for his next crop. Several months ago, Lawrence Rappaport of the Davis staff and his associates, Herman Timm and L. F. Lippert, found that a five-minute dip of potato seed pieces in a gibberellic acid solution can greatly accelerate sprouting. More recently, they found that the chemical can also break dormancy by systemic action—that is, sprays applied on potato plant foliage for periods up to seven weeks before harvest can break the rest period of potatoes that grow on the treated plants.

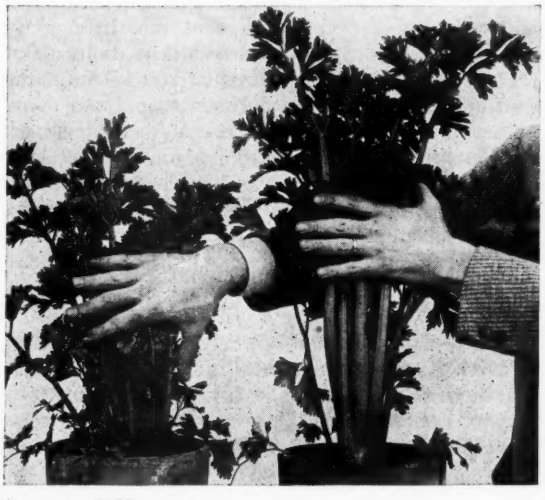
Now the Davis olericulturists and their colleagues on the Riverside campus are making further tests to determine which of the two treatments, the dip or the foliage spray, is the more practical for actual farm use. They would also like to know whether the chemical can hasten sprouting and produce a better stand under the hot weather conditions in the Southern California growing area.

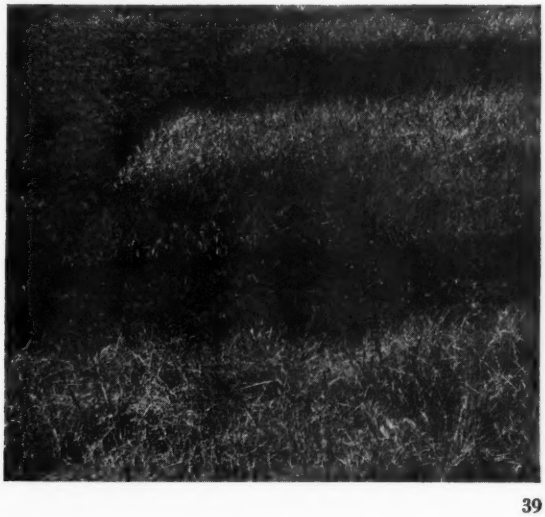
Rappaport also reports a systemic effect from gibberellin treatments on tomatoes. The chemical applied to new foliage on male-sterile tomato plants will translocate through the plant and stimulate fruit production without the normal pollination process, the specialist explains. Such treatments have increased fruit set, but the resulting tomatoes have generally been small. In present studies, the specialists are attempting to learn how the treatments affect tomato quality, and whether they can really increase the marketable yield of a tomato crop.

Studies with carrots and endive showed the Davis scientists that gibberellins might eliminate the need for the chilling period ("vernalization") that some plants must have before they can flower properly. More study is being directed toward a knowledge of the role of gibberellins in basic plant metabolism. Why do gibberellins and a chilling period produce the same effects on some plants? And why doesn't it work that way on other plants? In time, the University of California specialists should have the answers.

Lettuce experiments with gibberellins are in full swing on both the Davis and Riverside campuses. Scientists on the Riverside campus, under the direction of O. A. Lorenz, are conducting field tests near Blythe to determine whether gibberellins can produce earlier germination of lettuce in hot weather. If such acceleration could be made, growers believe they could harvest more uniformly and with reduced costs.

Most research has been on vegetables and flowers, but progress is being made in grasses, cotton and trees.





Both crisp-headed (Great Lakes) and leafy (Salad-bowl) lettuce varieties, as well as endive, can be induced by gibberellic acid to "bolt" into rapid seed-stalk development, tests at Davis showed recently. This effect, properly controlled, could be a boon to the vegetable seed industry. In his experiments at Riverside, Lorenz produced a similar "bolting" effect on celery.

Some seeds are also sensitive to gibberellin stimulation. Rappaport and James F. Harrington of the Davis staff found that tomato seeds soaked in a gibberellin solution germinated in cold soil (50 and 59 degrees) much earlier than untreated seeds. The same hastening effect was observed on beans and celery, but no response was obtained with seed treatment of onions, asparagus, cabbage, broccoli, and carrots.

Tests are continuing at Davis with seeds of peppers, cucumbers, muskmelons, lettuce, and endive. In further tests, some of the gibberellin-treated seeds will be dried before planting, other seeds will be dusted with a gibberellin powder, and the scientists will look for a systemic influence on germination of seeds from gibberellin-treated plants. Seed studies with gibberellins are also being made by researchers of the Associated Seed Growers and the Charter Seed Company.

Gibberellins in the Vineyard

What gibberellins do to grapes and grapevines is a problem that viticulturists at the University of California, Davis, are investigating from several angles.

Can the chemical lengthen grape clusters and branches? It can, according to Viticulturist Robert J. Weaver, and such elongation may be a boon to vineyardists by aiding sanitation and reducing mold and rot in such tight-clustered varieties as Thompson Seedless, Tokay, and Zinfandel. It might also give a big boost to another project under way at Davis—the development of a successful mechanical harvester for grapes.

Can the chemical increase the size of the grapes themselves? First results of this study show that gibberellic acid sprayed on the Black Corinth variety helped produce a larger set of excellent grapes. On the Thompson Seedless variety, the chemical has increased the size of the grapes and caused them to assume a longer-than-normal shape.

In future studies, the Davis viticulturists will examine the relation of gibberellic acid to carbohyrdate nutrition of the grapevines. They want to know whether the chemical's stimulation of yield and vegetative growth will later prove weakening to the plants. They'll also test gibberellin's effect as a breaker of dormancy on cuttings of hard-to-root grape varieties. And they'll see how gibberellins influence the rate of fruit maturity. Later, they may compare the quality of wines obtained from gibberellin-treated and untreated grapes.

Gibberellins in the Orchard

Orchard crops are producing their share of surprises in preliminary tests with gibberellic acid, report members of the pomology department on the University's Davis campus. Still in the early stages of his gibberellin studies, Pomologist Julian Crane has applied the new chemical to apricots, cherries, and figs. The treatment on figs induced parthenocarpy (fruit set without pollination), and the resulting figs are similar to those produced by pollination. On apricots, the chemical gave a big boost to early growth of fruits, but this was followed by an abrupt retardation in development and an eventual delay in maturity.

On apricot trees themselves, gibberellic acid caused new branches to grow to nearly twice their normal diameter, and in old branches growth was so rapid the bark sometimes split. Instead of making more phloem—the softer bark and food-conducting tissue—the gibberellin-treated tree was doubling its production of xylem, the tougher woody tissue. This effect points to a possible use for the new chemical in strengthening trees and allowing them to carry a larger crop with less pruning.

Pomologist Crane is also investigating gibberellic acid's effect on breaking the rest period in seeds and in leaf and fruit buds. And his associate, Hudson T. Hartmann, is putting the chemical on olives to see whether it can increase fruit size, hasten development, and induce flowering on vegetative shoots. Muriel Bradley, another Davis pomologist who specializes in fruit morphology and cytology, is examining the effects of the chemical on the shape, tissue structure, and composition of fruit and wood.

On the Riverside campus, citrus trees have been receiving some gibberellin treatments under the direction of Henry Z. Hield. Citrus seedlings dosed with the chemical shot up 600 per cent faster than untreated ones during the first 40 days after dosage, Hield reports. But when treatment ceased, they fell back and the untreated seedlings caught up.

Hield also tried gibberellic acid to prevent "June drop"—the early dropping of small fruit. He found a weak but positive effect in the laboratory, and one field test gave encouraging results. Now his experiments are being expanded to include field testing of the chemical's effects on flowering, fruit set, and fruit development. Emphasis will be on smaller doses to avoid the growth-depressing after-effects that heavy applicants have produced on citrus.

Promising findings such as these are being announced almost every week, but scientists aren't ready yet to make positive recommendations about the use of gibberellins. They have found too many contradictions in their experiments, and too many unknown factors remain to be examined, analyzed, double-checked in laboratory and field tests. And along with that no tolerances have been established for food crops by USDA, although toxicologic studies of gibberellic acid, completed and in progress, indicate that this plant growth stimulant is a safe agent.

Gibberellic acid is being manufactured by Merck & Co., S. B. Penick, and Eli Lilly & Co. The Velsicol Chemical Corporation is now engaged in the product research, market development and sole domestic distribution of all gibberellic acid manufactured by Abbott Laboratories. Quite a number of concerns have been licensed to formulate the acid in aerosols, sprays and powders and dusts. ▲

subject: **FERTILIZER**

market: **NON-FARM USAGE**

potential: **OUTSTANDING**

SALES of commercial fertilizer to the American non-farm market amount close to $200 million a year, according to a new survey conducted by the National Plant Food Institute.

The survey, first of this magnitude successfully completed, nails down that non-farm users buy from 2 to 2½ million tons of commercial fertilizer annually. This roughly is 10 per cent of the current annual total consumption of 20-odd million tons.

Using a *conservative* average payment of $75 a ton, NPFI says the non-farm uses add up to about $187.7 million a year. There is reason to believe, according to other sources, that the average payment per ton may be some higher, thus increasing the size of the total market.

The study says: "While most attention has been focused on the rapid expansion in farm use of fertilizer, which has been variously described as spectacular or phenomenal, non-farm use has been spurting upward twice as fast. Moreover, while total consumption has tended at least temporarily to level off in the last two or three years, non-farm use probably has continued to climb.

"As important as this segment of the fertilizer market has become, most authorities believe that there still remains a considerable untapped potential," the study says. The outlook for the future, it continues, "can be conservatively described as 'very encouraging.' "

New opportunities are created for non-farm fertilizer use by the trend toward suburban development both residential and industrial of formerly agricultural lands, the vast highway program, expansion of public parks, and playgrounds and recreational areas. Further, there is a growing awareness on the part of the non-farm population of the advantages of using fertilizer on turf, flowers, trees, shrubs and home gardens.

The study consisted of an analysis of available statistics bolstered by a new sample survey. Available statistics were used to draw some conclusions about geographical distribution of the non-farm market. The sample survey was conducted largely to determine estimated non-farm use of fertilizer by type of user.

Here, specifically, are the findings:

Private homes account for about half the total use of fertilizer for non-farm purposes. About 45 per cent of all non-farm homes in the U.S. used at least some plant food in 1956. The average quantity used comes to "a surprisingly high" 51 pounds per home. Average home-use ranges from 15 pounds in the Far West to 110 pounds in the South Atlantic region. (See Table 2)

All 74 golf courses included in the survey used commercial fertilizer in 1956. The average was 44 tons, of which 43 per cent consisted of organics such as activated sewage sludge, processed tankage, cottonseed meal, tobacco stems and dried manure. About 1/5 used some urea-formaldehyde products on the greens.

Most of the large airports, both commercial and military, used fertilizer in the sample year. They covered an average of 216 acres of turf, and maximum fertilizer usage was 138 tons. Most industrial plants use little or no fertilizer, but a few use relatively large quantities.

Of the 32 State Highway Departments responding to the survey, 26 used fertilizer and 6 used none. Of those that did not report, most are thought to have used little or none. Total highway use in 1956 is estimated to have been 21,868 tons. Seven states

(N. C., Ga., Ohio, Fla., N. Y., Miss., and Wis.) accounted for nearly 15,000 tons, or two-thirds of the total.

Construction of the new 41,000-mile Interstate Highway network, to be spread over the next 9 to 13 years, is expected to increase greatly the use of fertilizer for roadside development. The new highways will average 22 acres of turf per mile, or a total of 900,000 acres. If this total acreage were to be fertilized at the average 1956 rate, it would require 186,300 tons for turf establishment alone.

One of the significant conclusions drawn from the survey shows that per-capita rate of fertilizer use is lowest for "the very small towns and the large cities." While small towns usually have detached houses and relatively large building lots, the number of users such as golf courses, city parks, college campuses, and industrial plants are limited.

The rates of per-capita use are highest in cities with populations between 40,000 and 45,000. In cities above 50,000 population, per-capita use goes down—probably because the proportion of row houses and apartment buildings increases with size and the size of the average building lot decreases.

Non-farmers, as well as farmers tend to buy most of their fertilizer in large packages. This is indicated by a study of sales by package size in four urban communities. In all four, the 80-pound bag accounted for most of the tonnage. Although many different kinds and sizes of bags, bottles, boxes, envelopes and tin cans containing less than 50 pounds each were sold in each place, all of them combined totaled only about 3 per cent by weight each in Winchester, Va., and Prince Georges County (a Washington suburb); 15 per cent in Gettysburg, Pa., and 16 per cent in Winsted, Conn.

The study says that the proportion of weight of small package sales in smaller towns is probably even less than in these four communities—and that small package sales in larger cities is probably greater. ▲

TABLE I

Estimated U. S. Total Non-Farm Fertilizer Consumption by Types of Consumers, 1956[1]

Type of Consumer	Reports (Number)	Proportion Using Fertilizer (Percentage)	Average Amount Used (Pounds)	Average Area Fertilized (Acres)	Average Application Rate[2] (Pounds per Acre)	Total Consumers (Number)	Total Consumption[3] (Tons)	Standard Error (Tons)
Homes	1621	45	51	0.1	503	43,136,000[4]	1,099,968 ±	90,586
Golf Courses	74	100	88,721	68.	1,296	4,504[5]	198,626 ±	11,651
Airports	412	75	46,164	216.	209	6,839	154,438 ±	20,520
Athletic fields	13	92	7,065	8.	883	40,208[6]	142,035 ±	55,380
Industrial Plants	150	16	8,495	5.	1,699	22,000[7]	93,445 ±	78,870
Municipal parks[8]	49	88	95,027	608.	156	1,907	90,608 ±	28,510
High Schools	10	80	4,028	8.	503	27,068	54,515 ±	29,599
College campuses	29	86	36,222	52.	504	3,260	42,742 ±	8,253
Seasonal hotels	11	73	24,182	18.	1,343	3,418	41,327 ±	40,223
Government buildings[9]	22	64	1,542	1.6	969	50,000[7]	38,550 ±	21,800
Churches	48	50	209	.2	1,045	300,056	31,356 ±	9,602
Highways	31	80	892,591	2,157.	414	49	21,868 ±	686
Hospitals	12	75	5,080	9.	678	6,956	17,668 ±	8,500
Grade schools	258	54	185	.5	370	134,429	12,440 ±	1,748
Cemeteries, city and church type[10]	17	71	2,400	13.	185	10,000[7]	12,000 ±	4,250
Commercial buildings	433	5		.01	700	3,000,000[7]	10,500 ±	2,150
Tourist courts	56	77	671	.9	686	29,432	9,874 ±	1,560
Memorial cemeteries	36	100	18,234	22.	829	1,000[7]	9,117 ±	3,232
State and county parks	44	61	5,342	10.	534	3,187[11]	8,513 ±	2,236
Recreational Camps[12]	4	100	1,970	1.7	1,157	8,392	8,266 ±	2,694
Clubs, lodges, and other organizations	10	80	132	.2	660	50,000[7]	3,300 ±	2,175
Fish hatcheries, Government[13]	28	96	93,618	117.	828	35	2,388 ±	100
Fish hatcheries, Commercial	13	84	9,295	34.	396	152	704 ±	405
All other[14]	0						20,000	
Total							2,124,248	

[1]Based on a sample survey conducted for the National Plant Food Institute.

[2]Average amount used divided by average area fertilized.

[3]Average amount used multiplied by total consumers in each class, divided by 2,000 to convert to tons.

[4]Urban and rural non-farm households. March 1956 Census, Series P. 20, No. 76.

[5]Census of Business, 1955. Includes 1,014 commercial courses, 2,966 membership clubs, (Recreation & Park Yearbook, 1956); 478 municipal and county, and 16 States.

[6]Recreation & Park Yearbook, 1956. Includes 153 State, 23,964 municipal ball fields, 13,188 tennis courts and 231 bowling greens (Census), 672 commercial, and an estimated 2,000 colleges.

[7]Estimated.

[8]Recreation & Park Yearbook. 1907 municipalities had in 1956: 20,417 parks, 10,833 picnic centers; 58 arboretums, and 614 public gardens.

[9]Capitols, office buildings, post offices, court houses, police stations, public libraries, etc.

[10]Includes 3 national cemeteries and one pet cemetery.

[11]Recreation & Park Yearbook. State parks, 1896, county parks, 847, historic sites and monuments, 444.

[12]Sample includes one girls' summer camp and 3 fish and hunt clubs.

[13]Complete enumeration for Federal government, 20 States and one city hatchery. Includes natural streams and lakes fertilized in 2 States, but not farm fish ponds. Only warm-water hatcheries use fertilizer.

[14]Estimated. Includes military establishments, levees, etc.

TABLE II

Non-Farm Fertilizer Sales by Size of Package
Selected Communities, 1956

Package Size	Gettysburg, Pa.[1]		Prince Georges Co., Md.[2]		Winchester, Va.[3]		Winsted, Conn.[1]	
	Packages	Proportion of total weight	Packages	Proportion of total weight	Packages	Proportion of total weight	Packages	Proportion of total weight
Pounds	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Less than 1	1,560	0.14	1,819	0.02	424	0.02	1,763	0.48
1 and 1½	513	.38	1,705	.09	553	.12	272	.25
2–4	570	.90	91	.01	115	.05	72	.11
5	661	1.97	1,770	.49	468	.48	866	3.32
6–9	—	—	63	.02	—	—	30	.17
10–15	293	1.64	1,957	1.08	482	1.00	599	4.59
25[4]	361	5.44	730	1.01	269	1.39	388	7.44
50[5]	745	22.72	1,921	5.29	809	8.38	543	20.82
80	1,291	63.08	19,436	85.69	4,807	79.64	908	55.69
100	61	3.73	1,142	6.30	431	8.92	93	7.13
Totals	6,055	100.00	30,634	100.00	8,360	100.00	4,738	100.00

[1]Complete enumeration.

[2]Estimated to be 27 per cent of total sales. Enumeration included about one half of total dealers. Considerable quantities were sold in bulk and a fairly large tonnage of liquid fertilizer was sprayed on lawns by custom operators.

[3]Estimated to be 87 per cent of total sales.

[4]Includes a few 20, 22, and 30 pound packages.

[5]Includes a small number of 40 pound packages.

SAFETY CONGRESS

ON OCTOBER 21 and 22, members of the Fertilizer Section, National Safety Council will gather in Chicago as part of the National Safety Congress.

A full program is planned for the two-day meeting, with speakers drawn from the industry and from an insurance company. Those attending the meeting will have an opportunity to participate, for as shown in the accompanying program, time has been alloted for discussion.

T. J. Clarke, who will speak on "The Man Who Wasn't There," is a past chairman of the Section and is recognized throughout the industry as a safety authority.

"Observations On Latin American Safety" will be given by A. B. Pettit, director of industrial health and safety at W. R. Grace & Co. Pettit is chairman of the engineering committee of the Fertilizer Section and also of the air pollution abatement committee of the Manufacturing Chemists' Association. ▲

MONDAY, OCTOBER 21

P.M.
2:00 Opening Remarks by General Chairman
2:10 Election of 1957–58 Officers
2:20 "Front Office Safety" by Frank A. Gerard, safety manager, Olin Mathieson Chemical Corp.
3:00 "Safety—A Retreat or a Challenge" by John H. Foulger, M. D., director of medical research, E. I. Du Pont de Nemours & Co., Inc.
3:40 Discussion.
3:50 "How We Can Profit From Thorough Accident Investigation" by James E. Kavanaugh, supervising engineer, Engineering and Loss Control Division, The Travelers Insurance Company.
4:25 Discussion.

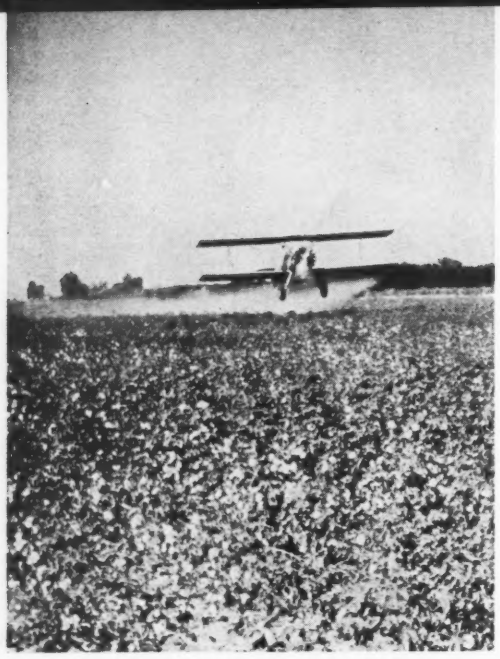
TUESDAY, OCTOBER 22

Presiding: General Chairman Elect.
12:00 Noon Luncheon—Speaker: T. J. Clarke, controller, Cooperative G. L. F. Exchange, Inc., Soil Building Division. Topic: "The Man Who Wasn't There."
P.M.
2:00 Announcements.
2:10 "Visualizing Ammonia Hazards," by E. V. Anderson, safety engineer, Johnson and Higgins, Brokers.
2:40 Discussion.
2:50 "Using Acids and Nitrogen Solutions Without Hazard—Carelessness Can Be Costly," by Elmer Perrine, technical representative, Nitrogen Division, Allied Chemical & Dye Corp.
3:35 Discussion.
3:50 "Observations On Latin American Safety," by A. B. Pettit, director, Industrial Health and Safety, W. R. Grace & Company.

Clark

Perrine

Petti



Some Facts and Figures on the Agricultural Pilot

By C. A. PARKER
Executive Director, NATA

"Mr. Air Applicator" of 1956 showed up as having a capital investment of $48,000 with an income of $58,400. His revenue flying totaled 761 hours for the year and was accomplished in 5.2 months of operation. In this period he treated slightly over 57,000 acres and employed 9.2 persons either full or part-time.

In spraying operations, counting concentrate and carrier, 68,300 gallons were put out, while total powder dust distributed was found to average 367,510 lbs. per concern.

These are some of the results of a survey conducted by the Agricultural Activities Division of the National Aviation Trades Association. Additional information was also obtained regarding industry practices, as well as chemical product and other needs of the air applicators generally.

The survey constituted a sampling of about 1 in every 15 applicators and brought returns from 30 of the most active agricultural states. The survey was originally developed by Mr. Robert Monroe of Prescott, Arizona, during his term as head of Agricultural Activities of NATA.

Since there is a problem in determining the actual number of air applicators that were active in 1956, an accurate projection of overall industry values is difficult. After review of the returns and applying a considered estimate of the number active, it appears that the air applicator industry has a total investment in the neighborhood of $75 million and produced a gross revenue in 1956 of over $90 million. It is also felt that the total hours flown could have approached the 1 million mark up from the 851,900 hours in 1955 and 644,000 hours in 1954, as reported by CAA. It is also certain that area covered in '56 increased again over the two previous years, which ran 60 million and 38 million acres, respectively, and could have topped 80 million acres.

Spraying in 1956 outran dusting in acres covered by 4 to 1, with fertilizing next in order of acres covered.

More than half of those reporting showed that their total business was entirely, or nearly so, from aerial applicator activity. It was surprising to learn that 83 per cent of the key people involved, heads of concerns, owners, etc., flew agricultural work themselves.

Regarding aircraft in use, Piper models were reported in excess of any other type. Only 5 per cent reported using multi-engine aircraft and the average planes in use per concern ran 4.2 for the year.

FINANCES: With respect to financial matters, 43 per cent had a capital investment of under $20,000. Returns, however, ran all the way to one company that reported upwards of $500,000, with those in the neighborhood of $150,000 to $250,000 constituting a rather surprising percentage.

The largest group with respect to gross revenues was that of approximately $15,000, with about 10 per cent of the returns falling equally in each of the categories of $10,000, $25,000, $45,000, and $125,000. Six per cent of the reports ran upwards of $200,000 gross revenue and two were over $200,000.

INSURANCE: Some information regarding insurance showed that about 50 per cent felt that public liability, drift and property damage insurance should be purchased by the acre treated. One-third of those reporting favored purchasing such coverage by the airplane, with the balance desir ng such to be supplied by the hour flown. It was shown, however, that the great majority now purchased it by the airplane.

Fifty-five per cent of the companies involved in the survey answers indicated that they carried workmen's compensation insurance, with about one-half the group falling in limits under $50,000 on liability.

Only about one-third showed that their insurance extended coverage to the grower.

ACCIDENTS: The largest number of accidents was in spraying and ran about five times that of dusting. The area sprayed ran some four times the acreage dusted. The next highest area of accidents reported was "on ground." It appears that applicators have come to terms out of court with respect to claims made against them in the very great majority of cases. The dollar value of claims settled was surprisingly low.

The ability of an aerial applicator to do his job well is seen in the surprisingly small number of acres that he re-treated in order to fulfill a guarantee or obtain customer satisfaction. Out of the total acres reported less than 1 per cent were done over.

CHEMICALS: The data received on acres treated with chlorinated hydrocarbons is considered to be erroneous. Only 6 per cent showed the use of organic phosphates, however.

ORGANIZATION & EXPERIENCE: The survey indicated that the majority belong to some type of state operators' or applicators' association, but only slightly more than one-third of those reporting belong to NATA. Forty per cent of those reporting were either college graduates or had attended college, with about 44 per cent listing the proprietor as a high school graduate. Experience in air application of the key party involved ran to 9.2 years as the average.

REGULATION: Regarding the matter of a CAA Air Agency Part or an Air Applicator pilot rating being established, those opposing were in the majority in both instances with some 54 per cent against a pilot rating and about 66 per cent opposing the Air Agency concept.

A high majority indicated that they were in favor of making use of shoulder harness in applicator aircraft mandatory, with about two-thirds of thse reporting also favoring a mandatory requirement for crash helmets. In contrast to this, however, roughly 90 per cent opposed any such thing as a mandatory stall warning device.

MISCELLANEOUS: The report indicates that there are about two state colleges conducting research for improvement of air application in comparison with each one that does not cover this field. About 65 per cent reporting indicated that a short course for dusters and sprayers was held currently in their state, with applicators (involved in the report) having attended an average total of some three courses each.

Eighty per cent reported that a shortage of agricultural pilots exists and an even higher percentage are apparently convinced of the need and desirability for "Ag" pilot schools. It was determined, however, that less than one pilot per year could be absorbed per concern.

Eighty per cent indicated they would like to have some type of professional journal covering "Ag" aviation. Development of an accounting system tailored to "Ag" aviation was not indicated by the majority as being in need or necessary.

Of special interest is the fact that 83 per cent of the returns showed that the applicator is enjoying cooperation from his county agent, with but few applicators not having asked for assistance and cooperation from that quarter.

In the equipment field, 90 per cent stated they felt that the present nozzles available for spraying were satisfactory.

A majority reported adequate medical facilities as being available for checking organic phosphate poisoning. This, however, still leaves a substantial segment of the industry that could well develop this source of protection. Encouraging, however, is the fact that about one-half of those who did not indicate facilities as being currently available anticipated that such facilities would be established for 1957.

In the marketing field, about 60 per cent indicated that they furnished a "package deal" to the customer.

CHEMICAL PRODUCT NEEDS

In the survey, air applicators were asked to state opinions on a number of vital points. The first of these was for an expression of opinion on the chemical products that they felt were needed for particular pests and crops which are not presently available.

Of particular interest is the fact that the need for an herbicide to control wild oats in wheat and small grains was the single "most mentioned" item in the reports. The need for a selected grass killer to control cheat grass in wheat, an herbicide for wild buckwheat in wheat and small grains, and a non-toxic chemical to fight the aphid in alfalfa and clover were also mentioned several times.

SINGLE MOST IMPORTANT DEVELOPMENT: The question was also asked, "What single development do you think would do the most to

New Chemicals Needed

TYPE CHEMICAL	PEST	CROP
Fungicide	Mildew	Lettuce, cantaloupe
Insecticide	Cabbage looper	Lettuce, cabbage, cotton
Weed killer	Annual weeds	Wheat, barley
Chemical to kill hardwood trees in pine forests.		
Longer lasting chemicals	Mosquitoes and gnats	Town and Swamp Areas
Chemical	Broadleaf weeds	Beans
Improved and lower cost chemical	Mites	Row Crops and fruit
Improved and lower cost chemical	Aphids	Row Crops and fruit
Chemical	Thrips	Beans
Selective hormone	Bind Weed	Wheat
Herbicide	Thistle	Peas
Low gallonage, acre fungicide	Blight	Tomatoes, potatoes
Low gallonage, acre fungicide	Scab	Apples
Low gallonage, acre fungicide	Brown rot	Peaches
Insecticide	Cut worms	Cereal grains
Chlorinated hydrocarbon	Alfalfa aphid	Alfalfa
Liquid arsenic that works	Boll weevil	Cotton
Better defoliant	—	Soybeans, cotton
Insecticide for mosquito control on rice fields that could be economically used on a large scale.		
Non-toxic insecticidal dust	European elm scale	Elm trees
Weed killer	Johnson grass	Corn
New chemical	Cabbage looper	Cole Crops and cotton

extend your season or increase the market for your services?" With respect to answers that centered around chemicals, the following is a summary of the principal opinions given:

- Chemical needed to dry up all weeds and defoliate soybeans so they can be harvested one week from application.
- A chemical spray to kill or control wild oats and wild buckwheat in small grain and crops.
- A substance that would effectively and economically hasten decomposition of straw and stalks.
- A true defoliant on short staple, dry land cotton.
- A chlorinated hydrocarbon for alfalfa aphid that would work in cooler weather.
- Pelleted D.D.T.
- Develop a good fungicide that can be sprayed from aircraft at low gallonage per acre for apples, peaches, tomatoes and potatoes.
- Better chemical to work on brush during a longer period of the summer regardless of moisture.
- A weed (cockelbur) control in soybeans.
- Liquid spray control of plant diseases at low volume.
- A cheap carrier, other than diesel oil, with just as good spreading, penetrating and non-evaporating characteristics.

Under the question of the "single most needed development" was an outstanding number of remarks relating to the need for better education. This included statements calling for a concerted educational program directed toward the grower regarding aerial application, what it can accomplish, and proper use of chemicals. Development of better knowledge regarding the farmer, his needs, and his crops, on the part of applicator was noted. One comment did not believe that many farmers realized what aerial application could accomplish under conditions of emergency. Further soil conservation education of the farmer was quoted as most needed as well as additional help to aerial applicators regarding air application needed from "Ag" colleges and extension services. Further public education through county agents, farm magazines, newspapers, as well as increased educational efforts by the various states were stated as needed, including use of documentary films.

The next most quoted item and which was mentioned in about 10 per cent of the replies related to fertilizing by air and fertilizers. The need for a concentrated fertilizer for more efficient use by air and to enable aerial services to compete with ground applications of fertilizer was noted. Improvements in fertilizers, the expansion of work to fertilize forest areas, and a better liquid fertilizer were particularly mentioned as one of the greatest needs in the industry.

A number of complaints were received regarding the present high cost of chemicals and a reduction in price levels as being a great boon to the aerial applicator. The lack of moisture during 1956 in many areas was fully reflected in the survey returns as having constituted a costly shortcoming. Miscellaneous complaints included the limited season of crop work and limited opportunities existing in some areas. The problem of farm prices as a deterrent to good business in the air applicator field was mentioned numerous times.

GREATEST PROBLEM: In special questions asked, the survey requested statements of opinion as to what constituted the greatest problem in conducting air applicator operations.

The largest single group of comments, constituting 25 per cent of all who made statements on this subject, indicated that their biggest problem was in qualified and adequate personnel with special reference to pilots. This supported the individual question that had been posed in the survey regarding opinions on pilot shortage and need for pilot schools. In these, the survey had shown that 87 per cent of those reporting claimed such a pilot shortage with a slightly higher percentage ascertaining the need for "Ag" pilot schools.

The personnel problem was followed closely by some 23 per cent who listed weather as their greatest problem with noticeable reference being made to the existing limits under which present sprays can be used with respect to wind and the need for expansion in this limitation.

Cut-rate operators and unethical practices on the part of competitors as well as operators who lack proper information on costs were seen by 13 per cent as the biggest problem confronting them.

Collections were the major problem to some 11 per cent, while 12 per cent indicated a need to find additional activities to expand the present "all too short" season and the problem of too great a concentration of activity required during its run.

A number mentioned the need for further education of the grower regarding the advantages of air application and commented on the lack of knowledge of what aerial application can accomplish.

NOZZLES: A pointed question regarding existing nozzles and a question on "improvements wanted" brought but a few replies. Of interest are the following:

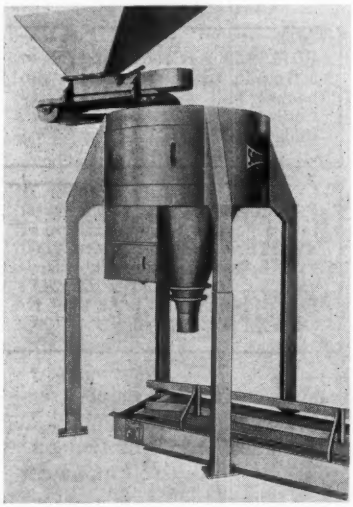
- Several replies referred to leakage as still being a problem and that more positive shut-off would be desirable.
- Stainless steel may be needed in fertilizers instead of brass, and wherever nitrogen solutions are utilized.
- A nozzle immediately adaptable to all micron sizes and gallonage output.
- Obtaining uniform droplet size is a problem and a convenient, quick adjustment to varied droplet sizes is needed.
- Diaphragm material could be improved.

The relatively small amount of replies regarding nozzles follows the thinking indicated in a specific question in the survey in which 90 per cent answered in the affirmative to the question, "Are the nozzles available satisfactory?"

The survey included one lonely comment to the effect that the biggest problem of that particular individual was to make enough money to be able to join his national organization—the NATA! ▲

FARM CHEMICALS
Equipment & Supplies

SOUTHLAND PACKER DISTRIBUTED BY CHASE



Newest bagging unit for the fertilizer industry is the "Southland Packer," a completely automatic, all-electric device for filling and weighing open mouth textile or multiwall paper bags, Chase Bag Co. reports.

Distributed exclusively by Chase, the Southland is manufactured by Chattanooga Boiler and Tank Co.

Fast handling of 50, 80 and 100-lb. multiwall paper bags is said to be assured, with 25 bags per minute as a typical working speed. Even 200-lb. burlaps pack rapidly and easily. Sustained high accuracy of weights over an extended run is guaranteed, Chase said.

Minimum change-over time from one analysis to another is an added feature of the Southland. Cylindrical hoppers and buckets allow a clean and complete flow of material. Simplicity of design reduces maintenance costs and problems. Parts are standardized and can easily be interchanged in plants where more than one packer is in use. No air or hydraulic fittings are used, thereby eliminating the need for supplemental equipment.

Complete information about the packer can be obtained by
CIRCLING 299 ON SERVICE CARD

B&L AUTOBATCH FOR LIQUID FERTILIZERS

A new, completely automatic control unit for batch processing of neutral solution liquid fertilizers has been introduced by Barnard and Leas Mfg. Co., Inc.

Called the B&L Autobatch, it is designed to meter phosphoric acid, aqua ammonia or other suitable nitrogen solutions, and water

in pre-selected amounts and deliver them simultaneously to an auxiliary batch-mixing unit. It is completely self-contained and factory assembled. The manufacturer says that installation in the field is accomplished quickly by connecting raw material supply lines, discharge lines and electrical connection.

Although the Autobatch was developed primarily for B&L batch-type neutral solution fertilizer processing plants, it may also be used to convert manually operated plants to automatic operation. For details,
CIRCLE 300 ON SERVICE CARD

REYNOLDS MAKES WATER-SOLUBLE FILM

A new polyvinyl alcohol water-soluble film is being made available for the first time this year as a packaging material for fertilizers, insecticides, soaps, detergents, anti-rust agents and other water dispersible products.

Called Reynolon by Reynolds Metals Co., the film will provide product protection during shipping and storage. Where used for packaging insecticides, it does away with the need for any direct human contact with the product.

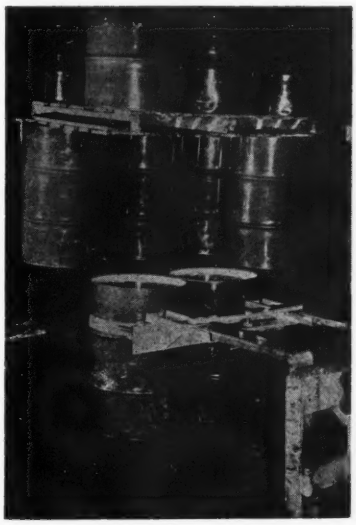
Reynolon water soluble films are tailored to the requirements of each specific application, according to W. J. Vogel, manager of Reynolds Plastics Div.

High speed bag-forming and heat-sealing equipment for the new water-soluble film already is available from one machine company, and several other firms have similar equipment under development, the film maker said.

DRUM HANDLING AUTOMATIC MECHANICAL ATTACHMENTS

Eight drum handling automatic mechanical attachments for lift trucks are now in production at Little Giant Products, Inc., to handle individual drums, two drums horizontally, two drums vertically and two or three drums at a time spotting one drum at a time.

An unusual feature of the V-1-F and the V-2-F attachments, which handle one or two 30 or 55 gallon drums respectively, is that



they may be used for intermittent handling of drums, as the attachments easily slip on or off of the end of the regular forks of the lift truck.

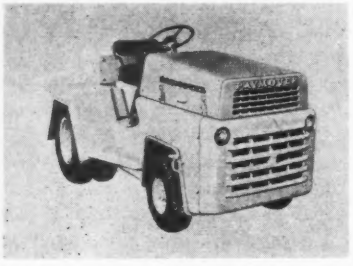
All eight of the devices operate with no need for hydraulic systems and may either be attached to the apron of any lift truck or slipped on the forks for intermittent use.

For more details,
CIRCLE 301 ON SERVICE CARD

HOUGH ANNOUNCES NEW PAYMOVER TOWING TRACTOR

Introduction of the first two "Paymover" towing tractors for commercial applications has just been announced by T. J. Schuetz, sales manager of the newly established Towing Tractor Section of The Frank G. Hough Co.

These new machines are the



model T-50 with 5,000 pounds drawbar pull and the model T-60 with 6,000 pounds drawbar pull. Although models which will be introduced in the near future will include both two and four-wheel steer, four-wheel-drive machines, the T-50 and T-60 are two-wheel-drive models.

The new Paymover units are compact and maneuverable, featuring torque-converter drive and automatic transmissions. Hough said they are ideally suited to industrial tractor-trailer operations, rail and motor truck terminal and stevedoring operations as well as the handling of all types of corporate aircraft for airport terminal movement.

For detailed specifications and other data,
CIRCLE 302 ON SERVICE CARD

SAFETY EQUIPT. GUIDE FOR ALL INDUSTRIES

A new catalog just published by General Scientific Equipment Co. presents the company's entire line of safety equipment in an easy-to-use buyers' guide arrangement.

Included is information on all types of protective equipment—from a small half-ounce dust mask to a large barrel lifter. Nearly all of the several hundred listed items are illustrated; general specifications and recommended uses are given for each.

Equipment is grouped according to its function so that the reader can compare similar products and select the ones best suited to his needs. Product descriptions are sufficiently detailed to permit a proper choice.

For a copy of the catalog,
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CATALOG I

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CHEMICALS

GIBBERELLIC ACID AND PLANT DISEASE

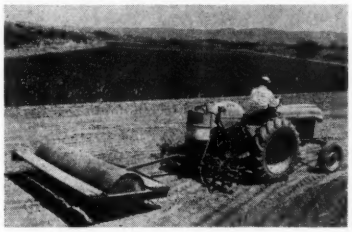
Severity of plant disease may be increased or decreased when plants are treated with gibberellic acid, depending on the concentration of the plant growth regulator. So stated A. E. Dimond and Malcolm Corden, of the Connecticut Agricultural Exp. Station in a paper presented at a meeting sponsored recently by the American Institute of Biological Sciences in Stanford, Calif.

The plant pathologists have found that severity of tomato wilt varies when plants are treated with gibberellic acid. Concentrations of 5 to 20 ppm stimulated plant growth for about two weeks. High concentrations increased wilt severity and low levels reduced severity of the disease when applications were made before plants were inoculated with the fungus causing Fusarium wilt.

Drs. Dimond and Corden point out that this effect of gibberellic acid is unlike that shown by other plant growth hormones such as 2,4-D and indole acetic acid, which always reduce disease severity.

APPLY VAPAM WITH SPECIAL BLADE INJECTOR

Personnel of Simplot Soilbuilders in Ontario, Ore., built this special blade injector in less than 24 hours for applying Vapam to



the soil. Vapam is pumped into tubes welded to the backs of knife-blade shanks, and injected into the soil at a depth of about six inches. The double row of blades permits injection at a spacing of five inches. Roller compacts earth, and helps liberated gas do its work of killing fungi, weeds and soil insects before escaping.

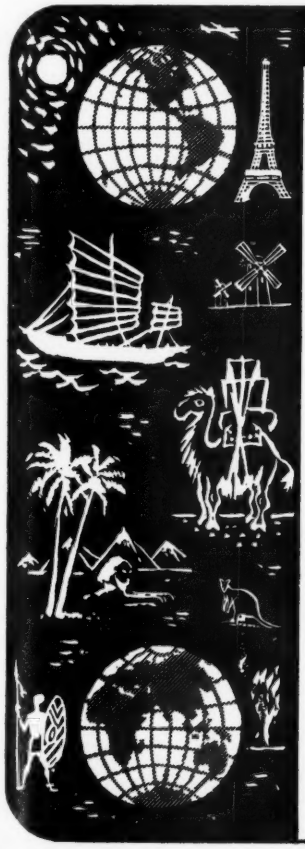
The photo was taken on Mark Sumida's farm. This year the gladiolus bulb grower treated 30 acres at a rate of 25 gallons per acre. Water was used in solution at a ratio of one part water to two of Vapam.

TOLERANCE FOR TOXAPHENE IN FAT OF SOME MEATS

A recent Food and Drug Administration ruling established for the first time a tolerance for toxaphene in the fat of meat from cattle. This permits feeding beef cattle with corn forage from corn treated with toxaphene for corn borer control.

In addition, the tolerance of seven parts per million for toxaphene in the fat of meat from cattle, sheep and goats means these animals can also be sprayed with toxaphene for protection against certain livestock insect pests, Hercules Powder Co. points out. The regulation states that the spraying of the animals or feeding

(Continued on page 51)



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with toxaphene-treated forage should not take place during the four weeks before slaughter.

USDA PROPOSES REVISION OF PESTICIDE LABEL RULE

To clarify its policy of not endorsing specific commercial pesticides, USDA has proposed an amendment to regulations for labeling these products.

Under the proposed change USDA would consider a pesticide misbranded if its label carried "any statement directly or indirectly implying that an economic poison or device, or any ingredient or constituent element thereof, or combination of ingredients is recommended or endorsed by any agency of the Federal Government."

Officials of the department's Agricultural Research Service point out that labels on some commercial pesticides bear such claims as "Formula Recommended by the United States Department of Agriculture" or "Active Ingredients Recommended by the United States Department of Agriculture." Claims of this kind have been interpreted to mean the product itself is USDA-endorsed.

The notice in the Sept. 10th Federal Register gives 30 days for any interested person to express views on the proposed amendment to the Regulations for the Enforcement of the Federal Insecticide, Fungicide and Rodenticide Act. Written views may be sent to Plant Pest Control Div., ARS, USDA, Washington 25, D. C.

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PATENT REVIEWS

FERTILIZERS

U. S. 2,792,286, issued May 14, 1957 to John D. Wordie and Davis A. Skinner, assigned to Union Oil Co. of California, describes a continuous process for the production of aqueous ammonium phosphate from crude "wet process" phosphoric acid.

As shown in Fig. 1, crude wet-process phosphoric acid is continuously withdrawn from a tank 10 and passed into a first stage reactor 12 provided with heating coil 12a. The fresh acid enters at the bottom of the reaction mixture. Ammonia is also continuously charged into the bottom of the reactor 12 from a tank 14. An intermediate ammonium phosphate, having a *p*H of 4.0-4.2 over flows through line 13 into a second stage reactor 17, heated with coils 17a, reacting with more ammonia. The final overflow product passing to cooler 20 has a *p*H of 6.3-6.7. After cooling, the product passes to a continuous separator 22 (e.g. a vacuum rotary filter), where the precipitated solids are removed and passed to storage through line 23, and the filtrate, consisting of a neutral clear aqueous solution of ammonium phosphate is passed to a storage tank 25. If desired, the solids formed in the first stage reactor may be separated prior to introduction into the second stage reactor, by means of a filter 29.

By the use of this two-stage process, the formation of gelatinous, non-filterable impurities is avoided.

U. S. 2,792,297, issued May 14, 1957 to Albert C. Mohr, assigned to Stauffer Chemical Co., describes a method of making treble superphosphate containing 2 per cent more available P_2O_5 content than normal.

Permian deposit phosphate rocks consist of minute agglomerates of relatively high grade material surrounded by a matrix of a relatively low P_2O_5 content. By proper comminution, a minimum reduction in size of the hard agglomerates can be effected, while a maximum release is achieved of the agglomerates from the matrix of the softer binding materials. The fine material thus separated is converted into phosphoric acid, by sulfuric acid leaching. The separated coarse material, containing the agglomerates, is then further ground, and acidulated with the phosphoric acid produced from the fines. The result is a treble superphosphate containing at least 45 per cent P_2O_5, and as high as 47.8 per cent.

U. S. 2,794,701, issued June 4, 1957 to Jack Ames and Edward K. Pierpoint, assigned to Imperial Chemical Industries Ltd., discloses a method of reducing the tendency towards caking and setting of ammonium nitrate.

The surfaces of ammonium nitrate particles are provided with a deposit consisting of a salt, soluble in a saturated ammonium nitrate solution at 20°C., of a condensation product of 1 mole of formaldehyde and 2 moles of a monomethylnaphthalenemonosulphonic acid.

U. S. 2,795,487, issued June 11, 1957 to Carl Otto, provides an ammonia saturator for producing ammonium sulphate crystals from coke oven gas. The principal object of the invention is to avoid the formation of deposits of ammonium sulphate crystals in the saturator.

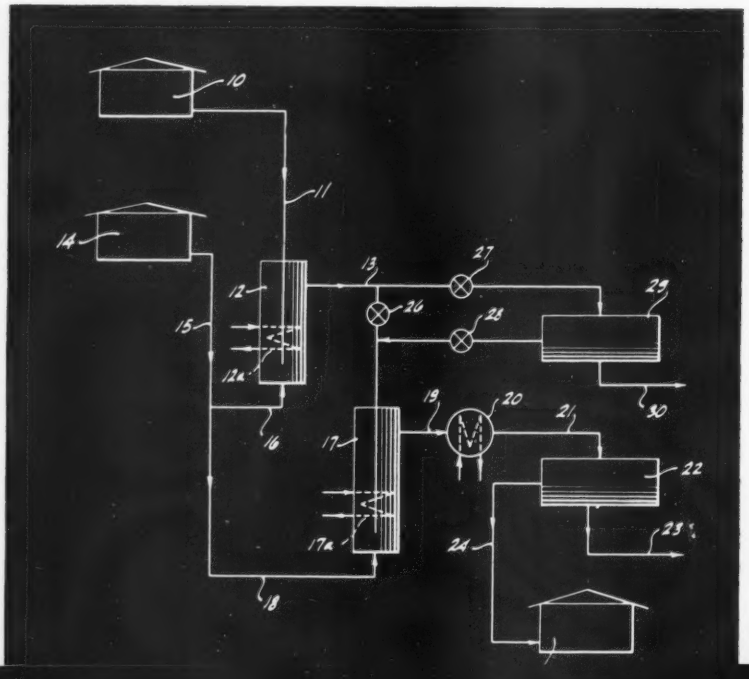
U. S. 2,795,495, issued June 11, 1957 to Adolf Schmatloch, Franz Schaub, and Walter Schuff, assigned to Ruhrchemie Aktiengesellschaft, describes a process for the production of granular non-caking ammonium sulfate nitrate, by contacting a granulated weakly acid ammonium sulfate nitrate containing an iron salt with gaseous ammonia. Iron oxide and hydroxide precipitate at the surface of the granules.

HERBICIDES

U. S. 2,792,295, issued May 14, 1957 to Maurice M. Wright, relates to a method of aerial distribution of hormone-type herbicides such as 2,4-D, avoiding the problem of air drift.

The invention consists of forming herbicidal pellets having a particle size between 10 and 80 mesh British Standard. Fertilizing ingredients may also be incorporated in the pellets. ▲

Figure 1.



PEST REPORTS

Presented in cooperation with the Economic Insect Survey Section. Plant Pest Control Branch, Agricultural Research Service. USDA.

EUR. CORN BORER HEAVY IN SOME AREAS

BY THE latter part of August, the second-brood pattern of the European corn borer was fairly well-shaped. In Rhode Island injury by second-brood larvae was light as were the populations in Maryland. Delaware reported increasing populations with larvae numerous in silks, ear tips and whorls of field corn.

Extensive and possible severe damage was expected in the central and southwestern districts of Minnesota. Heavy populations of egg masses ranging from 66–210 masses per 100 stalks were superimposed on a rather heavy first generation.

First-brood borers were heavier in northern Wisconsin than in the remainder of the state. Recent cool weather in the northern part of the state was expected to limit the emergence of second-brood moths. In the southern part, second-brood moths were numerous in light traps but the weather was expected to slow down hatching. By late August moth emergence in Iowa was almost 100 per cent complete. In Boone county an average of 32 fields showed an accumulative total of 138 egg masses per 100 plants with very few more expected for the remainder of the season.

The second-generation in Nebraska was heavier than anticipated with egg mass counts of 50–240 per 100 stalks whereas in Ohio egg deposition was on the decline and the fall infestations were expected to be light. Third-generation larvae were appearing in eastern Arkansas counties by the latter part of August. In Missouri egg mass counts for a third generation were up sharply with counts ranging from 80–320 per 100 stalks in the southeastern area.

SPOTTED ALFALFA APHID BUILDING UP IN AREAS

The spotted alfalfa aphid, which this summer was rather light compared to recent years, was building up in several areas by early September. Populations in the Fallon areas of Churchill county, Nevada, were higher than at the same time last year. Many fields were requiring treatment before cutting. The aphid was abundant in southern Utah and a substantial spray program was underway in Millard county. Eastern Colorado reported the heavier populations for that state with populations up to 10,000 per 100 sweeps. New Mexico populations were generally light to medium. However, some heavy infestations were reported from Eddy and Chaves counties.

General increase in spotted alfalfa aphid populations were noted throughout Kansas. However, predators were present with their population apparently varying with the aphid population. Oklahoma also reported an increase in aphid population in central counties but with numerous predators. In alfalfa fields of northeastern Nebraska populations were building up to severe infestations but the increase was slow in the southern and central part of the state. A few fields in southwestern Illinois were carrying damaging populations and in Indiana the first specimens of the year were taken August 26–28, in 10 southern and southwestern counties.

Light populations of the aphid were reported from Texas, Louisiana and Virginia. Heavy spotted infestations were reported from Alabama and North Carolina.

Among other cereal and forage pests the corn earworm was very active. Heavy populations were recorded on both field and sweet corn in Delaware and Maryland. Soybeans and milo were damaged by the pest in parts of Virginia, soybeans and peanuts in North Carolina. In Illinois corn earworm infestations ranged up to 60 per cent with some fields having 3 larvae per ear.

Populations were building up in sorghums in Texas, Oklahoma, Missouri, Alabama and Georgia. Field corn was 100 per cent infested with corn earworm in the Arkansas Valley and on the western slope of Colorado. In New Mexico heavy populations of the pest were in field and broomcorn throughout the state.

The potato leafhopper population remained rather high in some states. Counts ranged from 2 to 23 per sweep on alfalfa in Montgomery and Frederick counties, Maryland. The insect in latter August in Wisconsin caused greater reductions in alfalfa yield than all other insects. Considerable loss was expected in southern Indiana where heavy nymphal populations were developing by early September. In western and southwestern Illinois, adult counts were 60–100 and nymphal counts were 0–400 per 100 sweeps. High populations of 180–360 per 100 sweeps were also recorded in the Republican Valley of Nebraska.

VEGETABLE PESTS

Among the vegetable pests, mites were very active during the latter part of August and early September. Control of the two-spotted spider mite was necessary on potatoes in the Quincy, Washington, area and on hops in the Moxee and Wapato areas of the state. Beans and potatoes were infested in the Hazleton and Rupert, Idaho, areas. In the Thief River Falls area of Minnesota raspberry plants and evergreens were seriously infested. Tomato plantings were being damaged in New Jersey and light infestations on beans were reported from North Carolina. ▲

TABLE 1.—SALIENT STATISTICS OF THE PHOSPHATE ROCK INDUSTRY IN THE UNITED STATES, 1955–56

	1955				1956			
	Long tons		Value at mines		Long tons		Value at mines	
	Rock	P_2O_5 content	Total	Average	Rock	P_2O_5 content	Total	Average
Mine production	39,670,598	4,983,735	(1)	(1)	52,198,375	5,752,061	(1)	(1)
Marketable production[2]	12,265,248	3,886,732	[3]$75,379,250	[3]$6.15	15,746,781	4,959,978	[3]$97,921,916	[3]$6.22
Sold or used by producers:								
Florida:								
Land pebble	9,401,168	3,148,810	57,973,651	6.17	10,365,839	3,424,470	64,354,583	6.21
Soft rock	72,070	14,861	466,168	6.47	58,754	12,060	376,082	6.40
Hard rock	91,907	32,386	739,289	8.04	103,177	36,400	871,632	8.45
Total Florida	9,565,145	3,196,057	59,179,108	6.19	10,527,770	3,472,930	65,602,297	6.23
Tennessee	1,699,395	447,716	12,579,056	7.40	1,662,888	433,943	12,791,558	7.69
Western States:								
Idaho	1,122,012	297,122	5,550,745	4.95	1,206,526	313,762	6,044,258	5.01
Montana and Wyoming	[4]799,482	[4]238,637	[4]5,595,075	[4]7.00	713,891	211,732	4,794,067	6.72
Total Western States	1,921,494	535,759	11,145,820	5.80	1,920,417	525,494	10,838,325	5.64
Total United States	13,186,034	4,179,532	82,903,984	6.29	14,111,075	4,432,367	89,232,180	6.32
Imports	117,256	(1)	[5]2,702,955	[5]23.05	109,891	(1)	[5]2,626,226	[5]23.90
Exports[6]	2,183,084	719,695	14,269,300	6.54	2,685,116	875,644	15,648,691	5.83
Apparent consumption[7]	11,120,206	(1)	.....	....	11,535,850	(1)	.....	....
Stocks in producers' hands Dec. 31:[8]								
Florida	1,491,000	492,000	(1)	(1)	2,785,000	929,000	(1)	(1)
Tennessee[8]	229,000	65,000	(1)	(1)	251,000	69,000	(1)	(1)
Western States	[9]1,077,000	[9]272,000	(1)	(1)	1,396,000	359,000	(1)	(1)
Total stocks	[9]2,797,000	[9]829,000	(1)	(1)	4,432,000	1,357,000	(1)	(1)

[1]Data not available. [2]See table 2 for kind of material produced. [3]Derived from reported value of "sold or used." [4]Includes a quantity from Utah. [5]Market value (price) at port of shipment and time of exportation to the United States. [6]As reported to the Bureau of Mines by domestic producers. [7]Quantity sold or used by producers plus imports minus exports. [8]Includes a quantity of washer-grade ore (matrix). [9]Revised figure.

Production — June, 1957

Compiled from Government Sources

Chemical	Unit	June 1957	June 1956	May 1957
Ammonia, synth. (anhydrous)	s. tons	308,755	262,093	*334,209
Ammonia liquor, coal & coke (NH_3 content)	pounds	3,254,258	2,825,500	3,466,114
Ammonium nitrate, fert. grade (100% NH_4NO_3)	s. tons	164,787	124,949	203,062
Ammonium sulfate				
synthetic (technical)	s. tons	91,998	94,277	101,006
coke oven by-prod. (incl. amm. thiocyanate)	pounds	155,548,474	149,125,800	165,335,961
BHC (Hexachlorocyclohexane)	pounds	5,092,137	8,516,747	4,572,140
Gamma content	pounds	840,993	1,389,379	707,054
Calcium arsenate (commercial)	s. tons	2,786	2,010	1,343
Copper sulfate (gross)	s. tons	6,632	———	7,628
DDT	pounds	11,023,156	12,099,684	12,880,479
2,4-D Acid	pounds	3,061,244	———	2,780,878
esters and salts	pounds	**1,686,123	3,066,534	2,589,358
esters and salts (acid equiv.)	pounds	**1,351,002	2,181,436	2,018,931
Lead arsenate (acid and basic)	s. tons	[1]	422	*505
Phosphoric acid (50% H_3PO_4)	s. tons	330,568	299,338	383,249
Sulfur, native (Frasch)	l. tons	———	565,002	429,227
Recovered	l. tons	———	38,200	42,400
Sulfuric acid, gross (100% H_2SO_4)	s. tons	1,308,156	1,269,691	*1,422,267
Superphosphate (100% APA)	s. tons	170,537	169,568	*211,784
Normal and enriched (100% APA)	s. tons	83,506	92,626	123,173
Concentrated (100% APA)	s. tons	68,355	62,619	*68,057
Other phos. fertilizers (incl. wet-base goods)	s. tons	18,676	14,323	*20,554
2,4,5-T Acid	pounds	**603,237	426,765	589,044
Urea	pounds	71,619,423	61,853,120	76,563,212

*Revised. **Partly estimated. [1]Withheld to avoid disclosing figures for individual establishments. [2]Includes quantities for plant previously not reporting.

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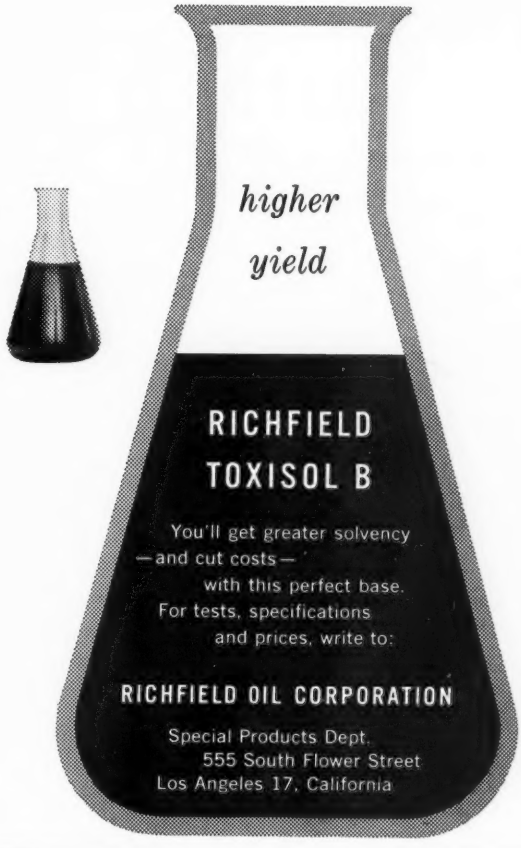

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INDUSTRIAL AND AGRICULTURAL
CHEMICALS

FERTILIZER MATERIALS MARKET

New York

September 20, 1957

Sulfate of Ammonia. There has been inquiry recently for export and some producers feel the market will carry along at present levels for some time. If steel production should fall, domestic production will be lower.

Ammonium Nitrate. Producers intend to raise the price $2 per ton on October 1 and another $2 per ton on January 1. Buyers have been a little slow to take advantage of present prices.

Urea. Some shipments were recently noted of imported material but domestic producers seem to feel they will dominate the market for sometime to come and also feel they can meet any foreign competition.

Nitrogeneous Tankage. Producers are still quoting $3 to $4 per unit of ammonia ($3.64 to $4.86 per unit N) f.o.b. production points but some producers are sold out for the balance of the 1957 and the market is in a fairly firm position.

Castor Pomace. Some recent offerings were made of domestic material at $45.50 per ton, f.o.b. production point, with some sales noted. Some imported castor pomace is being offered at Southern ports, mostly in Florida, at prices in line with the domestic market.

Organics. Organic fertilizer materials were quiet in tone with very few price changes noted. Blood was firm at $5.75, f.o.b. New York per unit of ammonia ($6.99 per unit N) and tankage last sold at $5 per unit of ammonia ($6.08 per unit N). Most of the material was going to the feed trade. Soybean meal fluctuated between $38 and $50 per ton, f.o.b. Decatur, Ill., in bulk for September shipment. Linseed meal was very strong due to the Government forecast of a short flax crop. Interest in cottonseed meal and cake for export was rather poor at the present time.

Fish Meal. While fishing operations were still going on in most sections and the catch was reported as fair, demand for fish meal was not too good, but on the other hand producers were not inclined to lower their prices. Last sales were made on the basis of $125 per ton, f.o.b. fish factories in the East.

Bone Meal. A little more strength was noted in this market and it was quoted at $62.50 to $65, f.o.b. production points according to quality. A fairly good demand was noted from both the fertilizer and feed trade. Some imported feeding bone meal continued to arrive at various ports.

Hoof Meal. Last sales made on the basis of $5.75 per unit of ammonia ($6.99 per unit N) f.o.b. Chicago with demand slow.

Superphosphate. A routine affair was evident in superphosphate with buyers only taking on supplies as needed. Triple superphosphate was available at almost all production points but demand was fairly good.

Potash. While shipments were said to be fair for this time of year, producers were eagerly looking for business and willing to meet competitors prices. Very little imported potash was coming in.

Fillers. A considerable demand was noted for low grade fillers to be used in fertilizer.

Philadelphia

September 10, 1957

Seasonal quiet is the general rule. There is still some export demand which helps to reduce presently large inventories. The recent increase in freight rates is expected to be reflected in higher prices in some directions. Ammonium nitrate and anhydrous ammonia are reported definitely scheduled for substantial advance October 1.

Sulfate of Ammonia. While the situation in sulfate has probably been better than some of the other raw materials, foreign demand is not now too keen and seasonal quietness prevails.

Blood, Tankage, Bone. These packing-house by-products are seasonally slow, with blood quoted at $5.25 per unit ammonia ($6.38 per unit N) New York area, and $6 per unit ($7.29 per unit N) Chicago. Tankage is listed at $5 per unit ($6.08 per unit N) in the East, and $6.25 per unit ($7.59 per unit N) Chicago area. Steamed bone meal is quoted at $60 to $62.50 per ton, and feeding grade at $68 to $70 per ton.

Castor Pomace. A limited tonnage is reported available shortly at $45 to $46 per ton.

Urea. This continues to be quoted at $110 per ton for the agricultural grade, but recent freight rate advances are expected to bring an increase.

Fish Scrap. Demand is reported as fair with supply not excessive. Prices remain as in our previous report: scrap $128 per ton, and $132 for menhaden meal.

Superphosphate. Supplies are plentiful and prices remain unchanged at 90 cents to 93 cents per unit A.P.A. for normal grade, and 98 cents per unit for the triple.

Potash. Trade continues seasonally slack with stocks sufficient to take care of all needs, and a dependence upon export demand to help out. ▲

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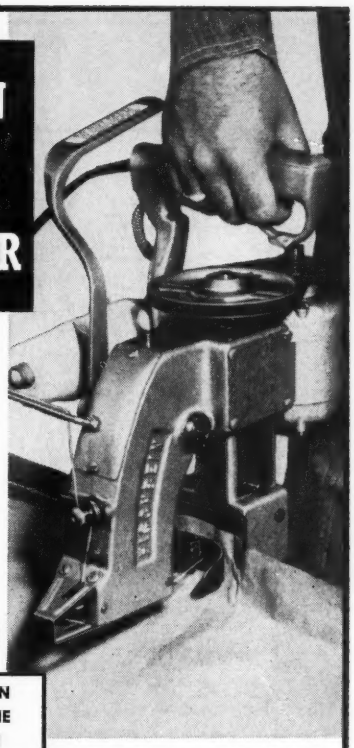

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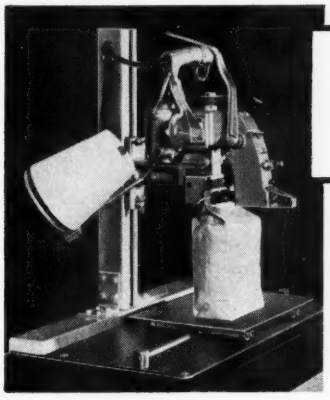

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AMMONIUM SULFATE
See Sulfate of Ammonia

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The Burlap Council, New York City
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Bradley & Baker, N. Y. C.
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Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
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Bradley & Baker, N. Y. C.
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U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
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Sohio Chemical Co., Lima, O.

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Nitro-Form Agricultural Chemicals, Woonsocket, R. I.

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